RESILIENT DESIGN FOR THE EXTENDED VÄLEN-FRÖLUNDA VALLEY

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ABSTRACT

The global concern for sustainability and for issues connected to climate change engages a vast group of professions and fields of science. As cities worldwide are growing due to a great relocation of people, ecology research has partly shifted its focus towards urban conditions and development. Urban areas have simultaneously become vulnerable to the consequences of climate change due to their position in the landscape and to their being economic and social centers. The questions of how to handle natural processes, disturbances and dynamics thus become highly relevant. Within ecology the term *resilience* is used to describe a system's ability to withstand disturbance. Urban resilience thus focuses on the processes, adaptability and transformability of the social systems of cities. Within landscape architecture there is no recipe for understanding resilience thinking or for applying it to landscape architectural design on the scale of urban design and urban planning. The purpose of this master project is therefore to explore the theories of resilience and to experiment with on-site design through the concept of resilience. As case study a southwest area of Gothenburg was used and test designs were made as interpretations of eight sites within that area. The suggested alterations take into account different scales and domains, which implies a need for further negotiation. The alterations thus invite to a discussion on the alteration principles and the issues of concern as well as on technical or management solutions. The thesis shows a possible method for reflective practice, using theories from other disciplines as evocative metaphors and building knowledge by combining theory and practice.

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INTRODUCTION

PROBLEM FORMULATION

Today's urban areas are growing rapidly. Cities have, although calculations vary from country to country, an ecological footprint per area one to two times larger than the cities' area itself. The resources needed for a city to uphold its functions exceed the city's physical boundaries and at a global scale humanity already exceeds the overall resources, while cities' own capacity to sustain ecosystem services and goods decrease (Davies et al. 2010; Erntson et. al. (2009). The need to describe and assess future risks and disturbances in these human-dominated ecosystems is the concern of the United Nations High-level Panel on Global Sustainability and the Resilient Cities Global Forum on Urban Resilience and Adaption (United Nations High-level Panel on Global Sustainability, 2012; Resilient cities, 2013). Urban resilience thus focuses on the processes, adaptability and transformability in the social systems of cities. Ecologists researching resilience acknowledge – along with politicians on global or local scale discussing resilient governance and landscape architects engaged in designing projects – that scale shifts: local sites need to deal with global tendencies and disturbances. How to be prepared for these events is of major concern. Vocabulary and concerns overlap fields of sciences and professions.

Gothenburg is an example of such a growing city. In the Välen-Frölunda valley, a suburban fragment of the Gothenburg urban region, ecosystem patches, modernist housing and various recent urban densification projects meet the challenge and risks of climate change. Thus, by doing a case study of this urban site, landscape architectural design can challenge and be challenged by the theory of resilience.

There is no recipe of how to understand resilience thinking in landscape architecture or how to take lessons in landscape architectural design on the scale of urban design and urban planning.

The motivation for this project is the need to explore resilience theories and to experiment with site design through the concept of resilience, interpreting resilience in landscape architectural design using the case of suburban Gothenburg.

PURPOSE OF THE MASTER PROJECT

Sustainability issues are connected with a vast amount of professions, where landscape architecture is only one of many practices affecting and being affected by policy documents and applying research results to projects. The landscape architects themselves are thus exploring scientific issues in their practice, by connecting and being under the influence of the scientific field of landscape architecture and of many others. When working on a site, however, what kinds of theories are available for landscape architects to work with towards the vision of sustainability? Could ecological resilience thinking, focusing on social-ecological systems, contribute as a dynamic framework? To start answering this question, the present work will provide the readers with an introduction into thinking on resilience and with a case study in which these thoughts are made operative through design for a particular site. However, this work is not meant to deliver the ultimate solution for resilient design, which needs much more theoretical consideration and research by design than a single master project allows for.

The main purposes of this master project are to:
– Clarify the understanding of resilience
– Test how to work with this understanding in design

This might also be of interest for the following reader groups - researchers in landscape architecture can learn from the study as it is trans-areal and thus challenges the field with knowledge from other

discourses; designers in landscape architecture and other designers can see the project as an experimental method, a reflective practice method combining theory and practice, here as an experiment with resilience arisen from within the field of landscape architecture; municipalities can learn from the interpretation of sustainable planning and can use the document as a basis for discussion.

RESEARCH QUESTION

How can thinking on resilience inform the development in the urban fragment of Välen and Frölunda, "the extended Välen-Frölunda Valley"?

Resilience thinking needs clarification; therefore the project is divided into two main parts: a theoretical review and a case study. The research question is first explored in a theoretical review, but the question "How?" also needs experimentation, why it is applied in a case study – a test design. The concluding part of the work, the Refelction, reflects on the project as a whole, where the handling of the research questions through theory and case study is addressed, as well as critique on material and methodology. The Reflection ends with a review of future possibilities.

MATERIALS, METHODS AND LIMITATIONS

This master project is a case study research based on qualitative methods, including a literature review, to conceive the framework for a test design on a particular site.

The theoretical review, discribed further bellow, is a qualitative literature review, where the documents studied are selected pragmatically in order to get a basic knowledge of the theme of resilience and resilience in the field of landscape architecture. The term *pragmatically* refers to the interconnectedness between the case study and the theoretical study, as they have been parallel in time. Both parts have thus influenced each other and the selections made in each part, but the case study work has been the driving force. The theoretical review functions in the work not to provide the case study with a toolbox or a manifest, but as a counterpart to reflect against, implicitly in the case study and explicitly in the final discussion.

The report layout has the order of starting with the theoretical review, continuing with the main part, which is the case study, and finally the summary is made as a reflection on the coherence of the first two parts. In the three parts different materials, methods and limitations are used, as explained below.

THE THEORETICAL REVIEW

During my studies on the landscape architect program I have seen the term *resilience* being used more and more in the field of landscape architecture, as well as in planning and architecture (Garcia 2012; Gunne, 2011; Miglioranzi, Giusti, (N2M), 2011; Barthel et al. 2010). Resilience theories are developed mainly within the fields of psychology, ecology, disaster relief/military and engineering (Salt, D & Walker, B 2012, pp. 2-3). The studies referenced here, however, are limited to the resilience theories developed within the research field of ecology. The theoretical review is divided into three subject areas: "On social-ecological resilience", "On resilient cities" and "On resilience and landscape architecture", these subject areas correspond with the subtitles in the theoretical review. They treat the perspectives of resilience connected to the project question: ecosystem ecology and urbanity.

The selection of texts is due to the project format small; it is an extraction, a fragment of the literature on the subject, and the texts are related in time to my own time as a landscape architect student. The oldest text referred to is though the Bruntland-report from 1987, but it is used as a canonical text within the discourse of sustainability. The texts are reviewed in order to answer to how the term and the conception of resilience is treated by the authors and what in these conclusions that can be interpreted in order to inform the practice of landscape architecture.

In "On social-ecological resilience" the documents used are articles and books from researchers connected to the Resilience Alliance network and the Stockholm Resilience Centre chosen in order for the subject matter to be studied in contemporary research papers and books (Resilience Alliance, 2103, Stockholm Resilience Centre 2013).

In "On resilient cities" the United Nations Commission of Environment and Development and The United Nations High-level Panel on Global Sustainability reports are used together with the Resilient Cities Congress papers to get the perspective of urbanism and resilience.

In "On resilience and landscape architecture" four landscape architect theorists have been selected for their explicit use of a resilience perspective: Allan & Bryant (2011), Hill (2005), Farsø (2010) and Sieverts (2003; 2008). In the case of Sieverts the term resilience is not used but the text includes system thinking on urbanism, landscape and ecology (Diedrich, 2011). The material consists of articles, essays and books.

THE CASE STUDY

The case study is a site interpretation with a development proposal for the Frölunda-Välen Valley. The case study is a design experiment, a test design, where issues on urban development in the Frölunda-Välen valley challenge and are challenged by thoughts on resilience. The complexity of site matters also includes inputs, collaboration and negotiation with other actors and stakeholders. Therefore the test design has an open end; the design decisions are suggestions open for discussion and collaboration. Where this work ends another work continues.

The material used here is the site, "the extended Välen - Frölunda valley". The site is an urban fragment and a suburb, located in a valley on the Gothenburg rocky coastline, with properties related to the theories of "Zwischenstadt" and "Fragmented urban landscapes", by the urban theorist Tomas Sieverts (2003; 2008) and landscape architect researcher Mads Farsø (2010), both used in the theoretical review. The two theorists together with the exhibition and competition "Fremtidens forstæder", showed at Danish Architectural Centre (Fremtidens forstæder, 2013), argue for the properties and thus possibilities in the suburban landscape to develop sustainability and resilience.

Elisabeth Meyer (2005) writes in her essay "Site Citations – The Grounds of Modern Landscape Architecture" in Site Matters:

> "Site concerns permeate the design process, leaving their compartmentalized role in pre-conceptual design analysis. These repositioned site concerns challenge the modern divide between rational site analysis and intuitive, creative conceptual design: design as site interpretation, and site as program, not surface for program."
> (Meyer, 2005, p. 93)

As Meyer writes, doing site interpretations results in a methodology wherein the material becomes the method and the method will delimit the material and vice versa. Designing in this work is named *Site interpretation* and it is a learning process termed by Helga Nowotny (2008) as "working knowledge" and by Carol J. Burns & Andrea Kahn (2005) as "thinking thought practice". The authors stress the integration between theory and practice, a knowledge developed during practice using all tools necessary; in this case literature study, seminars, exhibitions, site visits, mails and meetings, visiting archives and studying other projects and, by working this knowledge, the project develops through a continuous validation and selection process (Nowotny, 2008, p 13; Burns & Kahn, 2005, p. 9). The documents and maps connected to the site are part of the site reading and mainly consist of policy documents from national, regional and municipal levels. The documents are collected in References at the end of the thesis. The maps used are referred to in the case study.

ON READING

As Kristina Hill & Bart R. Johnson remark in their introduction to *Ecology and Design* that the epistemological differences between science and design can be difficult to bridge, and these differences are part of shaping every profession's operational space and frames of communication (2002, p. 17). The epistemic displacement is sometimes obvious; it is simply another language that is for non-professionals, difficult to understand, but most of the time the epistemology is disguised in a familiar language. As a landscape architect student I read and understand texts from the horizon of my own discourse, but in order to inform the project with the conception of resilience is has been necessary to engage with the approaches and perspectives of other disciplines (POINTS – Potsdam International Network for TransArea Studies, 2013). In my own trans-areal reading, both in the reading of theories in the theoretical review and in the site reading in the case study, the term resilience acts as a metaphor. It has been an evocative image that has worked as a comparative concept, giving neither a fundamentally new theoretical framework, nor simply a different image (to mirror one's own), but staying in a place in between: informing without the need to embrace a whole new epistemology (Diedrich 2010).

1 THEORIES/ EXPLORING RESILIENCE THINKING AS A BASIS FOR LANDSCAPE ARCHITECTURAL DESIGN

1.1 SOCIO-ECOLOGICAL RESILIENCE

This first introduction to the term resilience is informed and defined by the scientific field of ecology. It is a field that has gone through radical changes over the last decades as theories have developed by systems thinking on many levels – a development of which will be given a brief summary. The text below introduces the definition of the term *resilience* and its connectedness to an ontological fundament[1]: a natural scientific perspective that gives a basic condition for how the world functions, illustrated by the concept of the Anthropocene. In the texts used, that condition, the Anthropocene, functions neither as a political nor as a philosophical statement but as a universal scientific truth, a truth observed from the perspective of an objective observer. Secondly, resilience thinking gives a deeper understanding of the conceptual framework connected to the definition of the term resilience. The resilience thinking conceptual toolbox is by the theorists used as a way of thinking when observing and interpreting social-ecological systems, a methodology for empirical studies or a hypothesis to prove true or false.

1.1.1 RESILIENCE AS ONTOLOGY

The theorists in this chapter all use quite similar sentences when defining the term resilience. The researchers David Salt and Brian Walker, two authors with numerous scientific articles published on the theme of resilience, give in their book *Resilience Practice – Building Capacity to Absorb Disturbance and Maintain Function* the following definition which will be the one used in this chapter:

> "It is the capacity of a system to absorb disturbance and reorganize so as to retain essentially the same function, structure, and feedbacks – to have the same identity." (Salt & Walker, 2012, p. 3)

The definition is, however, also embedded in the framework of the Anthropocene and thus of social-ecological systems as well as in a whole set of interlinked concepts of resilience called "Resilience thinking". The term Anthropocene is used by natural scientist to position the current geological period, a subdivision of geological time, as a period where humanity is the major force of change to the ecosystem, both on a local scale and on the biosphere as a whole. We have according to the scientists now left the Holocene and entered the Anthropocene era (Folke, 2003). When studying ecological systems the human influence can not be ignored, as Carl Folke and his fellow researchers position in their article "Resilience Thinking: Integrating Resilience, Adaptability and Transformability". The intertwining of the human and ecological sphere is named socio-ecological systems, systems studied from the perspective of resilience thinking (Folke, 2006; Carpenter, Chapin, Folke, Rockström, & Walker, 2010). Each system studied, by the resilience researchers used in this text, is thus viewed through the lens of the Anthropocene; one presupposition is that both the system itself and its disturbances are impossible to disconnect from human involvement in earth's systems[2]. The scientist are thus through the term resilience given both a worldview and a terminology to observe the world through[3].

1. Here scientific ontology refers to the study of the entities presupposed by scientific theories, not to the study of the theories themselves.

2. Within the fields of philosophy, the nature-human dichotomy was overturned by for example Jacques Derrida in his work *De la Grammatologie* from 1967. How other fields of science such as the philosophical texts by Derrida or social tendencies influence the ecology theorists are not mentioned or discussed, neither by the authors used in this master thesis, nor will it be discussed further in the thesis.

3. The scientist, then, is not a reader but an observer, which differs from the discourse of landscape architecture and other fields of science. This is described in the introduction as qualitative reading; see also Derrida in Footnote 2 above.

1.1.2 A BRIEF HISTORY OF RESILIENCE WITHIN ECOLOGY

The ecologist C. S Holling has had an important role in the development of thinking on resilience. As described by Folke (2006) in "Resilience: The emergence of a perspective for social-ecological systems analysis", the resilience perspective is based on the work by C.S. Hollling, whose research on interacting populations of predators and prey shifted from ecological stability theory to the understanding of a system's ability to persist disturbance by absorbing change. Ecological systems were in Holling's studies described as having multiple stability regimes, a discovery that acknowledged a non-equilibrium theory within ecological systems. The focus changed from looking for stability boundaries to variability, as in the definition of resilience above. A system's resilience depends therefore on how much disturbance the system can take before it tips over and another set of variables (functions, structures and feedbacks) makes it enter another stable configuration. Here stability is understood as a functional carrying capacity that is constantly dynamic, as internal and external changes force internal reorganization in order to maintain the system's identity (Folke, 2006).

Holling's thinking resulted in a specific branch of ecology, continuing today through researchers like Folke, Walker and Salt, specifically focusing on the connection between the social and ecological spheres – the socio-ecological systems (synonym to social-ecological systems). Folke further means that this focus detaches resilience thinking from what he calls mainstream ecology, which looks exclusively on natural systems without regarding the human actor (Folke, 2006).

Both Holling and his followers, Folke, Walker and Salt (among many others), use this non-equilibrium theory to study ecosystems; it both becomes hypothesis – which can be deductively tested true or false – and method, a checklist of what properties to look for. Resilience is thus neither good nor bad, but a dynamic property of a system (Folke, 2006; Salt, D & Walker, B, 2012, pp. 20-21, 25). For a scientist then, resilience is not necessarily desirable, not an ethical stance or a commitment, but a new set of unquestionable facts. When the resilience concept is used in other knowledge fields, as described in the two following chapters, the term will hold a range of positive connotations, positioning the user of the term as an interpreter and an actor in the service of resilience.

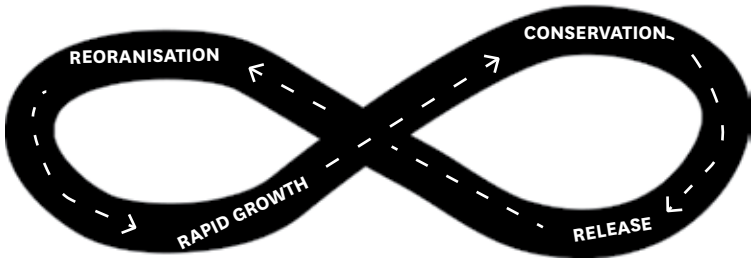
1.1.3 RESILIENCE THINKING – A CONCEPTUAL SUMMARY

Although Folke does not recognize the scientist him/herself as necessarily acting politically or ethically or having a personal agenda when researching resilience, he suggests that resilience thinking (as one of many fields of science working on ecology) will be able to contribute as an integrative and collaborative science model for a transformative change of social-ecological systems in accordance with policy implications for sustainable development (Folke, 2006). Folke hereby presents resilience thinking as an inherently inviting and adaptable methodological model of science. What is necessary, then, is a possibility for all other sciences to get a close and detailed insight into the disciplinary content of resilience thinking. The conceptual framework of resilience can be studied in a vast amount of papers; in this project an elementary conceptual framework of resilience thinking is given in order to provide an idea of what kind of science model – what kind of thinking – Folke is aiming for in his article as a base for collaboration. The key terms will now be briefly described in order to both give a clearer explanation to Holling's work and to give an idea of how socio-ecological systems are explained by Salt and Walker and their handbook *Resilience Practice – Building Capacity to Absorb Disturbance and Maintain Function* (2012), articles by Folke and the glossary from the Resilience Alliance Network webpage.

When understanding a social-ecological system, a complex system is studied, but not everything is important. Salt and Walker call this to look for *requisite simplicity*, which means to find the minimum necessary information about a system in order to manage its values in the most efficient way according to the people managing the system (Salt & Walker, 2012, p 23). When the word *identity*

is used in the quote (in the definition of resilience above) and henceforth in the context of social-ecological resilience it describes a system's capacity to maintain the same functions and structures despite outer and inner changes and to not fundamentally turn into something else (Salt & Walker, 2012, pp. 2-3). *Complex adaptive systems* are systems that can handle change, absorbing or buffering the disturbance by reorganizing themselves to keep the same identity and to continue functioning as before. In this sense complexity means that the components in the system are independent and interacting as they are steered by and at the same time are steering the processes they act upon, which gives a kind of structure that constantly adds novelty and variation to the system as components change over time (Salt & Walker 2012, pp. 4-5). Studies on ecosystems have shown that this kind of on-going system dynamics over time creates cyclic movements called *adaptive cycles*. The systems studied have lifecycles that are usually illustrated like the figure on the side (fig.1), with a developing fore loop and a regressive back loop. When a system is in fast development the phase is called "rapid growth". Such a phase is often followed by the more stable phase of "conservation" wherein the development comes to an end and the system enters into the back loop by the "release" phase as energy is released and the system starts to "reorganize" (Folke, 2006; Salt & Walker 2012, pp. 11-14).

Fig 1. Adaptive cycles



Understanding adaptive cycles can help a manager to interpret a system's behaviour, but in order to fully understand it one needs to know how the system is linked to its surroundings, across both scale and domain. When a specific social-ecological system is studied a certain scale is in focus, a certain temporal and spatial dimension, but to be able to fully understand the system in the focal scale other linked scales must be discovered and understood. A system is always linked to one or many larger and finer scales, each one subsisting in a particular adaptive cycle. What happens in one scale affects another, in what is called cross-scale dynamics. The term *panarchy* describes the hierarchy between scales and their internal adaptive cycles, and that the connections between them create a system of changes and resistance within the separate scales, but the connections decide the dynamics of the overall system of scales (Salt & Walker, 2012, pp. 15-18; Resilience Alliance [2013-02-21]).

A complex adaptive system interacts across a broad realm of scales. What happens at one scale, for example the climate, affects both the system's focal scale and the scale below, which Salt and Walker call *linked scales*. *Panarchy* is the word used to describe dynamics across scales (Salt & Walker 2012, pp. 15-18). Not only does a system link across scales (with their own adaptive cycles involved), but also consequently different *domains* are linked: changes in the social, economic or ecological domains influence each other (Salt & Walker, 2012, pp. 10-11).

When managing a system it is important to manoeuvre away from *thresholds*, the tipping points where a system is disturbed to the level of entering another regime(Salt & Walker, 2012, pp. 4-10). In order to stay away from thresholds a system needs to be *adaptable,* the individual components need to adapt to new conditions to maintain its identity. Diversity, openness, reserves, tightness in feedbacks, modularity and redundancy are shown to be important characteristics for resilient systems, which means, as Resilience Alliance writes in their glossary, that "resilience is the key to enhance adaptive capacity" (Salt & Walker, 2012, pp. 92-96; Resilience Alliance [online]).

Both Folke and Salt and Walker remark, though, that resilience is not always desirable; it is not good or bad, but a dynamic property of a system (Folke, 2006; Salt & Walker 2012, pp. 20-21, 25). A system can be very resilient, but having to transform a system into a fundamentally new one, which is better functioning according to the conditions, can sometimes be the goal set of a management. Folke describes the difference between *adaptability* and *transformability*:

> "There is an increased emphasis on transformability into improved social-ecological systems as opposed to adaption to the current situation. An emphasis on transformability implies extending the focus in social-ecological research to systems adaptive governance in order to explore the broader social dimension that enables adaptive ecosystem-based management." (Folke, 2006)

In order for a system to transform, linked scales or domains need to be adaptive (in Folke's case the managing system of governance needs to be adaptive) but the situation can be the opposite, where a system's adaptability may rely on a transformation in linked scales or domains. To manage and build resilience costs: *Resilience comes at a cost.* There is a difference, though, between resilience to a specific disturbance (so called specific resilience) and to a general disturbance (so called general resilience), as the effort made or the deprived utilization of the resource in specific resilience are measurable and possible to calculate, whereas resilience to a general threat cannot be assessed in the same way as there is no specific goal or outcome of the desired resilience. General resilience, on the other hand, consists of a constant high-optimized tolerance that must be assessed based on the present decreasing or increasing of a number of characteristics. What a decreased general resilience costs is therefore difficult to calculate (Salt & Walker, 2012, pp. 21-22).
The above quote by Folke illustrates what is also described in Salt and Walker – that assessing and managing resilience has to do with collaboration between a number of stakeholders, each one adding to the basic knowledge and understanding of both the ecological systems and the systems of governance. Folke continues by stating four main parts of adaptive governance: understanding that ecosystem dynamics need both experts and local knowledge, developing management practices that continuously respond to and learn from ecosystem feedbacks, building adaptive capacity in order to foresee and understand external drivers and disturbances, together with creating flexible institutions that work in multi-level network systems (Folke, 2006; Salt & Walker, 2012, pp.127-134).

Resilience thinking as Folke et al. and Salt and Walker describe it puts time and space – continuous dynamics – in the fore room of understanding complex adaptive systems since knowing a system's thresholds, domains and linked adaptive cycles are requisite information. But the stakeholders need to both articulate what value is to be promoted by management and to decide whether there is a need for tuning into a new situation by guiding a transformation at one or many scales and/or domains.

1.1.4 SUMMARY

The first issue is for how the term resilience is used within the field of ecology (through the theorists above), which is the actual understanding of how social-ecological systems function, named the non-equilibrium paradigm, and the package of terms that comes with this understanding. The non-equilibrium paradigm made ecologists look for links, flows and dynamics, namely what builds resilience and when and where a system's thresholds are at. The field of ecology also introduced the term social-ecological systems to state that in the current era, the Anthropocene, the development of natural systems always depends on human acts. The stakeholders need to actively agree, first of all on what the system is, then what in the system they want to build resilience on. When Folke (2006) calls resilience thinking integrative and collaborative he refers to the need for an iterative reading of the system by many different actors, such as landowners, users, experts and decision makers, in order to assess resilience and the management of resilience through creating an adaptive management system. This is a care-taking-by-tuning-in-the-system-method. The natural system is in the centre of everyone's attention and the management organizes and

reorganizes in accordance with the feedback from the system in order to manage its resilience. This is the second issue from the first part, "On social-ecological resilience".

Resilience is thus a term that can describe both how socio-ecological systems function and, as systems are linked in scales and domains, how an overall worldview unfolds into what can be called an ontology of socio-ecological systems. The focus of the texts is using resilience thinking both as a way to describe systems (the world) – a set of terms to be used by the researcher – and as methodology and hypothesis. The authors argue that since systems are intertwined on so many levels different expertise is needed to interpret and agree on the management of parts of systems. It is thus with the common language of resilience thinking that collaboration can take place.

When working on the specific issue of sustainability many knowledge fields are circulating around the same area of interest, thus suggesting, as the resilience thinkers above, a common language as a base for collaboration. But would the ecologists still have the precedence of interpretation in a collaborative act, based on their ontology? Who decides what is to be agreed upon? Is there room for a mutual act of understanding of each other's fields of science in order to develop the term resilience?

1.2 RESILIENT CITES

For landscape architects urban situations are very common to work within and biodiversity or ecosystem services are goals to keep or increase. This chapter on urban resilience is, however, turned towards resilience thinking as it developed within politics and policy documents. Knowledge from the socio-ecological resilience thinking also here continues to function as a methodology within this discourse of urban resilience, but the known properties of resilience are used as a tool for both analysing and structuring the interpretation of the city as a system and as part of many systems. In the texts used, the natural world becomes the model for the cultural world, and the properties of resilient systems are translated into systems of governance and are likewise possible to prove resilient or not by empirical studies. Accordingly, a new definition of resilience will be presented in the text, together with a common understanding of climate change as the main threat or disturbance to urban areas. But resilience acts not only as a scientific ontology, telling about the essence of how the world functions as a system, but also as a political ontological claim to work towards: "Resilient people. Resilient Planet" becomes "A future worth choosing", as the recent UN High-level Panel on Global Sustainability alleges.

1.2.1 RESILIENCE IN POLITICS

One explanation for the shift in use of the term resilience in the context of urbanity might depend on the difference in context: urban areas grow rapidly. The current system of growth the cities ecological footprint exceed the city's physical boundaries and at a global scale humanity already exceeds the overall resources, while the cities' own capacity to sustain ecosystem services and goods decrease, write Davies, Edmondson and Gaston (2010, pp. 20-21) and Ernston et al. (2009). Cities are not to be compared, then, with the ecosystem management and adaptive management explained by Salt and Walker. Instead The Resilient Cities congress, which will be introduced below, and the scientists engaged in urban resilience propose an angled perspective from social influence on

ecosystems to human-dominated ecosystems.

The purpose of the use of resilience is a different one from the ecologists' resilience thinking. The Resilient Cities congress[4] papers are collected in the series *Resilient Cities 1 & 2*. In the introduction to *Resilient Cities 2* editors Otto-Zimmerman and Balbo declare that the capacity to reduce vulnerability and to adapt to change are properties cities will need to procure due to the effects of climate change: "A sustainable city must be a resilient city. A sustainable community must be a resilient community." (Otto-Zimmermann (ed.), 2012, pp. 3-8). When the term resilience is used in *Resilient Cities 2*, what is aimed at is the resilience to climate change – the Resilient Cities organization has come to the conclusion that the main threat to urban societies are disturbances caused by climate change. The word also comprises a political vision to gather around to make the scientists and the political leaders of ICLEI (Local Governments for Sustainability, the World Mayors Council on Climate Change) collaborate in order to gain knowledge of the field of adaptive planning and of the threat of climate change as such. ICLEI therefore defines resilience (as a political claim) with focus on governance:

> "Resilience is the capacity and ability of a community to withstand stress, survive, adapt, bounce back from a crisis or disaster and rapidly move on. Resilience needs to be understood as the societal benefit of collective efforts to build collective capacity and the ability to withstand stress" (ICLEI, 2011)

The resilience term here turns away from the natural system towards resilience of the community as the resilience building properties known from the studies of systems in the biosphere are transferred to become properties of preference for communities.

One of the contributing papers, "Introduction: Urban Risk Assessing Vulnerability at the Local Level" by Yuzva K. (2012), in *Resilient Cities 2,* focuses on the possibility for local governments to navigate within the uncertainty of climate change with the help of expertise and to, through public collaboration, collect as precise information as possible about the current local situation (Otto-Zimmermann, K (ed.), 2012). On the same theme Morchain (2012) is concerned about the constraints city governments have in their work with climate change adaption: difficulties in funding, lack of coordination across both local and other levels of governance, difficulties in conducting participatory processes, knowledge, communication and implementation insufficiency, inappropriate vertical and horizontal instruments such as legislation and planning codes make local governments reactive rather than proactive and Morchain argues for an urgent need of structural support to individual cities (Otto-Zimmermann K (ed.), 2012). The scientists argue for the need for developing working practices of governance principles. They are through these invitations opening up for a discussion on, not the definition of resilience, but how to build it. Thus the term is acting as a goal set with positive connotations and not only as a functional property, as in resilience thinking above (Folke, 2006; Salt, D & Walker, B, 2012, pp. 20-21, 25).

1.2.2 URBAN RESILIENCE

How to understand urban socio-ecological systems? As already mentioned, the main concern for managing resilience in cities is the resilience to climate change, which shows that, once again, understanding the biosphere and the mutual impact between it and human-built environments calls for collaboration between many layers of society. The authors Snep and Opdam (2010) estimate two important scales when discussing urban ecosystems. At a site scale there are patches of a certain type of ecosystem that are acting and interacting as fragments in their urban (non-living) context and at the scale of the urban landscape a pattern of ecosystem patches, interacting or not, is embedded in the urban matrix. This pattern becomes a network that may interact on a regional scale. According to Davies et al. (2010) these patches of

4. Since 2010 ICLEI – Local Governments for Sustainability, the World Mayors Council on Climate Change and the City of Bonn, Germany have launched Resilient Cities, World Congress on Cities and Adaptation to Climate Change (in 2012 renamed Global Forum on Urban Resilience and Adaptation). (ICLE, 2013)

urban ecosystems have, depending on the scale: different actors, different time-scales, different goals, different policy directions etc. Neither agreeing on the resilience to climate change of these patches nor understanding the impact nor how changes will affect the larger system is an easy task. However, the scientists Abunnasr Y. and Hamin E. M. (2012) argue in their congress paper for the need to strengthen urban ecosystems. Abunnasr and Hamin stress that increased green infrastructure and thereby integrating eco-system services[5] into the adaption planning policies is a "no-regrets approach" which will benefit communities regardless of the impacts of future climatic change.

In their article, Erntson H. et al. (2010) argue for cities being at the core of climate change in a twofold way: firstly, research has proven that well-nigh all ecosystems' resilience is affected by urbanity (compare: the Anthropocene) and secondly, urbanity acts as centres for knowledge and innovation. The article translates the knowledge from adaptive governance in the nonurban social ecosystems (the authors refer to Folke) to the urban situations, which they call "Human-dominated ecosystems", and decodes a lack of theory that on a systemic level connects the city scale with the scale of systems of cities – "resilience *in* cities" as opposed to "resilience *of* cities". The authors write:

> "More explicitly we lack theory to analyse the panarchies of urban networks, i.e., the dynamic interlinkages between social and technical networks that sustain energy, matter and information, and how these dynamics networks influence ecological networks and the capacity to generate local-to-regional ecosystem services". (Erntson H. et al. 2010)

The article links the scale of the city to that of cities and articulates that human-dominated ecosystems are spreading across the world. The intellectual and ecological goods within the city should, however, be used in the most efficient way to help the development of cities in a sustainable way, as Erntson et al. (2010) believe that full overview of the intricate network of cities is the only way to detect the most efficient handling of eco-system services and that is, according to the authors, also sustainable.

The multi-functionality which ecosystem fragments in cities have to carry in the future will, according to the authors mentioned in this chapter, make resilience assessment of those ecosystem fragments a difficult task. The focus is instead on collaboration, growing knowledge and the vertical structure of both management and governance. Ernston et al. acknowledge that planning and governance are always integrated in politics and that the dependency of researchers on funding steers them into becoming "data providers" rather than "connective actors across scales" (Erntson et al. 2010). But what Erntson et al. do not acknowledge is that science as such can be political when writing papers that interpret resilience as being a goal set for a community or when writing papers for the Resilience Cities Congress that have a political claim or vision, as was done in the ICLE definition of resilience above.

1.2.3 A RESILIENT PLANET

One of the most influential policy makers on a global scale is the United Nations High-level Panel on Global Sustainability. The message their recent report *Resilient People; Resilient Planet: A Future Worth Choosing* is similar to that of Otto-Zimmermann's and Erntson's et al. above: basic organizational and democratic structures must function in order for a society to cope with climate change, and like the ICLEI reports it is a political vision. But it is also possible to see the connection with the reports and socio-ecological thinking from the first chapter, where resilience is used mainly as a conceptual framework.

Reports of the kind to be mentioned are political ontologies: visionary documents that provide politicians on a local scale with a vocabulary and a goal set. The term sustainability was introduced

5. 'Ecosystem services' is used by the UNEP agreement on Millennium Ecosystem Assessment 2005 to describe the four main categories of ecosystems' contribution to human health: supporting services, regulating services, provisioning services and cultural services (UNEP, 2013)

to politics in 1987 via the United Nations document *Our common future* (United Nations-report on the World Commission On Environment and Development, 2013), also known as The Bruntland Report, and the continuing work of that report has until now resulted in a number of reports. In the Bruntland Report sustainability was understood as a union of economic growth, social equality and ecological sustainability. The report says that:

> ”Humanity has the ability to make development sustainable to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs.” and continues “The concept of sustainable development does imply limits – not absolute limits but limitations imposed by the present state of technology and social organization on environmental resources and by the ability of the biosphere to absorb the effects of human activities.“ (UN-report on the World Commission On Environment and Development, 1987, § 27)

The buffering capacity of the biosphere and social organization as it is formulated in the report has similarities with the resilience thinking approach above, although they originate from different discourses. When the United Nations High-level Panel on Global Sustainability outlined the nearly 20 years since the Rio Earth Summit, their report was called *Resilient People; Resilient Planet: A Future Worth Choosing* (United Nations Secretary-General's High-level Panel on Global Sustainability, 2012). The introduction to the Rio20-report reads:

> “Sustainable development is not a destination, but a dynamic process of adaption, learning and action. It is about recognizing, understanding and acting on interconnections – above all those between the economy, society and the natural environment“. (United Nations Secretary-General's High-level Panel on Global Sustainability, 2012)

Many of the terms from resilience thinking are current and at the same time the term sustainability is adjusted from having the goal to meet the needs of today's and future generations, as shown in the quote from the Bruntland-report above, to becoming a learning process. To be able to choose, in accordance with the report title, the panel focuses instead on the possibility and opportunity of making that choice at all. The report says: “Real choice is only possible once human rights, basic needs, human security, and human resilience are assured”. Resilience in this case is to be built by social protection, disaster risk reduction and adaption planning. The panel concludes by arguing that no shift towards a green economy can develop if people are not empowered by basic social security nets (UN High-level Panel on Global Sustainability, 2012, p 6). On a planetary scale, the scale of the UN-reports, the policy documents on resilience are disconnected from the limitation of urban regions or urban situations but engage in the democratic progress of human society as a whole.

1.2.4 SUMMARY

In urban ecology and urban resilience the natural systems are a minority, merely patches in the unbroken non-living matrix of the city and silent actors in the network of human and non-human actors in human-dominated ecological systems. Natural processes are despite this at the centre of attention, not only as they help the urban life as a whole due to their capacity of providing ecosystem services, but also mainly as they continue to act as sources of disturbance – i.e. climate change. In urban systems, as described in the texts above, the focus is then turned away from the actual disturbances and towards the efficiency of the social networks to build a low risk society in order to act before and after a crisis caused by climate change.

Resilience thinking for cities corresponds with ecological resilience thinking and incorporates the same when arguing for the urge for making societies resilient to climate change – they both involve socio-ecological knowledge on systems and the organizational structure of communities and on how a well-functioning order must be an adaptable one, as is also mentioned by Folke and Salt

and Walker.[6] But the power of having a common goal set (or a common enemy, if you wish) is that all available sciences are welcome to contribute to solving the question of climate change. Thus collaboration is mentioned throughout the texts in various ways: the concern for better-functioning public collaboration or basic democratic processes is found in the texts by Morchain (2012) as well as the UN Rio20-report, here resilience works both as methodology and political ontology. When resilience is used for collaboration between scientists/experts/ stakeholders to find solutions for adaptive planning in cities, it is similarly to Folke (2006) above argued as a terminological framework through which lens it is possible to make agreements on (Erntson et al. 2010; Abunnasr Y. and Hamin E. M. 2012). Finally, ICLE definition of resilience above is using resilience as a term that supports argumentation for collaboration between citizens to build collective capacity. Here resilience is part of a political vision and thus it is also possible to argue that the resilience term and terminology work metaphorically to communicate properties wanted, more than actually digging deep into developing or integrating resilience thinking. At the same time, resilience is something else in this new context; the focus has shifted and thus the term develops. The discourse of urban resilience, then, has simultaneously been developed and evoked by resilience.

6. Within both Stockholm Resilience Center and ICLEI there are researcher groups working with the perspective of governance and resilience, though the field of political science is not treated within this thesis (Stockholm Resilience Center, 2013; ICLEI 2013).

1.3 RESILIENCE AND LANDSCAPE ARCHITECTURE

In the following part four different landscape architect perspectives use the concept of resilience with a more or less intentional clearness. The first article by Allan and Bryant uses a direct translation of the ecological resilience definition with the prepositional objective that the definition will link together different sciences and practices with the use of a common theoretical framework. The authors suggest "Resilience" both as an ontological starting point – saying: the socio-ecological systems function like this – and as a resilience methodology as the terms from resilience thinking become a way of interpreting a site or a situation. Resilience thinking also becomes a methodological toolbox when the authors operationalize the terms into spatial properties and functions. The important issue for Hill, in the second perspective, is to show how an ontological shift in one field of knowledge, in this case ecology, has fundamentally changed the field of landscape architecture. Ecological resilience thinking is in Hill's text also a reflection of ontological shifts to come and of the difficulty of seeing through a metaphor, especially when it derives from another profession. The third perspective is given through Farsø's article, in which resilience is shown as ontology, methodology and hypothesis through practicing landscape architects and theorists. Sieverts, the last theorist within this theme of landscape architecture and resilience, has for decades developed planning through system thinking but he is also the most radical of the thinkers as he imagines fundamentally new landscapes, proposing cross-scale/cross-domain transformations.

1.3.1 RESILIENCE AS A CROSS-DISCIPLINARY TOOL

When Penny Allan and Martin Bryant (2011) write their article "Resilience as a framework for urbanism and recovery" in *Journal of Landscape Architecture* they have two main perspectives: they are proposing resilience as a theory framework for urban planning and they are engaged in the specific case of disaster recovery of urban areas. The authors argue that resilience has the potential to bring

different fields of practice together through a shared theoretical framework, a perspective found already in the previous chapters, in this specific case urban designers and recovery planners. The authors believe, though, that the terms resilience and sustainability have become everyday words and therefore need to be clarified and redefined to fully work as a theoretical base. The two professions mentioned, urban design and recovery planning, have already engaged in theories of chaos, complexity and system and even resilience regarding cities, but the authors propose the definition from "ecological resilience", using both Folke and Salt & Walker as references. They find the definition useful as it offers methods for human intervention to build resilience into a system. Allan and Bryant select eight of the ecosystem attributes they find useful for urban design and recovery planning and translate them into a set of spatial interventions. The resilience term diversity is, for example, compared with and interpreted into the urban design typology: mixed use, short blocks, variety of building age and density, spatial heterogeneity and functional diversity. This can, according to the authors, in case of disaster turn reactive planning into a proactive and preventive cross-disciplinary planning instrument (Allan & Bryant, 2011). As Allan and Bryant are not absorbing the resilience thinking but translating it into an urban planning terminology they are creating a methodology based on resilience thinking without being the methodology of resilience thinking. What Allan and Bryant do not consider when constructing this methodology is the problem of shifting discourse and communicating across discursive fields, which is what happens in cross-disciplinary collaborations, which is the final remark in Hill's article below.

1.3.2 RESILIENCE AS A NEW ONTOLOGY FOR SITE

Allan and Bryant mention the interpretations of the field by Kristina Hill in regard to how landscape architecture has examined the framework of resilience and ecology (Allan & Bryant, 2011). In her article "Shifting Sites" in *Site Matters*, Kristina Hill discusses the influence of ecology on the landscape architect conception of site. Hill finds that the new ontological prerequisite "the non-equilibrium paradigm", referring to Holling's studies in the 70s (mentioned by Folke above), has been most challenging for the profession, whereas there no longer is such a thing as balance or stability within living systems (Hill 2005, pp. 131-132). The word *site* itself, originates from being delimited in size and situated in a specific location, a definition of the word that stands in contrast to this new ecological ontology of dynamics. Hill marks out three important shifts in ecology which affect the conception of site: firstly, "the spatial scale shift" signifies the turn from organisms as delimited entities to parts of larger systems, as the study of energy flows becomes more important than that of spatial distribution (Hill, 2005, pp. 135-141). Secondly, in "the temporal scale shift" the previously open systems were translated into temporal terms, which makes this second shift regard the impossibility of drawing temporal linear conclusions, such as: what happened in the past must not necessarily predict the trajectory of the system. Instead the system's resilience becomes the important key to predict future states. This is what previously has been mentioned as the "non-equilibrium paradigm" (Hill, 2005, pp.141-146). Thirdly, "the spatial pattern shift" combines both system thinking and time thinking. The concept "shifting mosaics" is a method for studying the dynamics of, for example, a specific species over time within a spatial framework in order to draw conclusions about future dispersal (Hill, 2005, pp. 146-150). The ecologist perspective on time and space has according to Hill been most influential and has radically changed the meaning of the word site in landscape architecture.

Hill stresses a number of relevant questions that become important for landscape architecture now and in the future, other than tracing boundaries: what processes are creating the flows in the focus area; what can be the source of future influence on the site and; how can we understand the role of humanity in the ecosystem from understanding nodes of interaction and energy flows? Finally Hill poses two challenges – how to graphically create figures that represent both time and space and how to distinguish the scientific metaphor as metaphor and not as concrete truth (Hill, 2005, p 132.) Hill is showing the power of influence from another field of science, but at the same time argues for being aware of

epistemological differences and thus strives to being as clear as possible when communicating with others.

1.3.3 RESILIENT DESIGN

In the way Hill encourages learning from the history of theory as a tool for reflecting on contemporary tendencies, Mads Farsø reviews the parallel story of the field of landscape architecture's use of ecology in his article "Towards a new landscape architecture. The resilient city"(Farsø, 2010). The text navigates among a vast number of landscape architect theorists and practitioners and three main uses of resilience thinking or "how ecology informs landscape architecture", as Farsø puts it, can be found in the text. When resilience/ecology is used as systems thinking and when cities are viewed as landscapes, and hence ecosystems, the need for embracing site dynamics and facilitate the complexity, connectivity and adaptability of the site becomes what Farsø describes as the process-based design of landscape architecture today. Farsø puts James Corner and Anita Berrizbeitia as important theoretical contributors to this tendency. Julia Czerniak brings in the thoughts on ecology as helpful in telling the story of a project. Resilience in this case is making the design itself informative and legible. Czerniak is concerned about communicating back the design but also about being intentionally persuasive, according to Farsø, as she believes that democratic justification is needed for those who use and pay for the designed sites. Farsø quotes Czerniak: "What matters – when resilience is taken to a design and management context – is how the tension 'between efficiency and persistence, constancy and change, and predictability and unpredictability' is handled" and Czerniak argues that the schemes most adaptive to participatory feedback will be the ones that survive.

Inspired by the French practitioners Corajoud and Chemetoff, Farsø (2010) presents a third attitude for the informed designer. The designer subject is here a person taking responsibility and showing respect to the site, as it is worthy of close attention due to the accumulation of memory, money and time that is already put into the place. What is already there is acknowledged as redundant and the site itself becomes the project. To try the validity of the design the designer is managing the process over time and makes interventions possible to adjust and adapt to the current situation's linked scales, different contexts and forthcoming changes. As an act of responsibility the economy of the project is a source of both limitation and inspiration and must be handled in a way as to gain maximum output.

Resilience has in Farsø's examples had the impact Hill is describing: it has modelled the conception of nature, as in the understanding of dynamics in ecosystems, and it has brought a systemic thinking on cities as complex adaptive systems and thus social-ecological systems.[7] The methodology from resilience thinking concerns the properties of complex adaptive systems. This knowledge is taken into account in Farsø's text when designers and theorists interpret site and when they propose design interventions. Process and adaptability over time have become design tools, both for site reading, site intervention and for the design itself, in so-called adaptable design. The question of governance and management can also count on the use of resilience as methodology as site always engages people, users, the designer, the managers and the rules, regulations and policies connected to it. And in tune with the resilience mode of the future's unpredictability, designers argue for the need of the project, whereas resilience is used as a hypothesis-in-practice: only by doing a project the project question or intent, the project hypothesis, can be proven valid or not, and the project itself must thus with its inherent strategies be an adaptable one.[8] Farsø is not, however, testing his theory on every site but argues for the suitability of the particular openness of the suburb for resilient design interventions.

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7. The systems thinking approach has developed parallel with many fields of sciences Donella Meadows (2008) notes in her book *Thinking in Systems*, naming the fields of: System thinking and modelling, System thinking and business, System thinking and environment and System thinking, society and social change. For more resources www.thinkininsystems.org.

8. Resilience comes, so to say, post-project; it is not possible to guess a project's resilience or argue for it being resilient before it is made and tested. Therefore I call this hypothesis in practice. Projects can, however, be structured in correspondence with known properties for resiliency.

1.3.4 THINKING IN SYSTEMS

The theorist Tomas Sieverts is by Farsø considered influential due to his concern for the possibilities for the suburban landscape as platform for this kind of new landscape of ecology/new resilient city (Farsø, 2010). Sieverts can in this case be interpreted as the only theorist having special interest in the resilience term *transformability*, although he is not using any words from resilience theory. With his systems thinking he is envisioning a fundamentally new order both in the hierarchies of governance and in the spatial layout of the suburb – or the urban landscape that he studies and interprets. Sieverts is using an iterative method similar to that proposed by Walker and Salt when assessing resilience and also proposing an adaptive management system.

Not only is Sieverts's focus on "Zwischenstadt" or "Fragmented urban landscape" an interest in the spatial formations emerging in urban regions, but he interprets these sites with the perspective of system thinking (Diedrich, 2011; Sieverts, 2003; Sieverts, 2008, p. 255). Sieverts describes how the complexity and variation within the urban regions have reached a tipping point where the traditional means of steering the development – space, money and time – no longer are proven to be purposeful as these sectors (space, money and time) are intertwined in this complex system. With this knowledge Sieverts argues for recognizing both the different scales of the landscape and how they are connected, in order to find the appropriate design intervention or "aesthetic level", to use Sieverts's terminology from *Improving the Quality of Fragmented Urban Landscapes – A global Challenge!*. Sieverts also discusses the possibilities occurring when systems are close to collapse, which is when new things are allowed to happen, to be compared with the adaptive cycles of ecosystems described in resilience thinking, the state close to collapse are as mentioned earlier called the "release phase" as energy is released and the system starts to "reorganize" (Sieverts, 2008, p. 261; Folke, 2006; Salt & Walker 2012, pp. 11-14). The type of change Sieverts envisions is on the scale of the fragmented urban landscape. This scale is the missing link between both smaller places and the region and as part of the urban region it also connects to the global scale. As a mediator of scales the fragmented urban landscape needs to adapt to both local and global rules, and to successfully act as mediator the local identity must be developed from the cultural landscape itself (Sieverts, 2008, p. 261). In *Cities Without Cities: An Interpretation of the Zwischenstadt* Sieverts posits time, money, ecology, collaboration, legibility and diversity as important considerations when developing this new type of landscape (Sieverts, 2003, p 51). The fragmented urban landscape needs furthermore to facilitate exchange of people, have democratically legitimate self-organization and to host flexible larger scale governance. But this shift is a challenge and Sieverts ends with "Improving the quality of fragmented urban landscapes requires courage, patience and a passionate zest for the future" (Sieverts, 2008, p. 261, 263). As Sieverts does not find the current links between domains and scales well-functioning, he proposes transformations, a fundamentally new order, by strengthening those links, and his proposals are related to the properties of resiliency: diversity, openness, reserves, modularity, redundancy and tightness in feedbacks (Salt & Walker, 2012, pp. 92-96; Resilience Alliance [online]). By improving the missing link in such a way, and as scales and domains are linked, the transformed fragmented urban landscapes will give an overall improvement as sites are interconnected.

1.3.5 SUMMARY

The concept of resilience has informed the landscape architect perspectives above on many levels. The trust in the concept and the resilience thinking as a cross-disciplinary framework has reoccurred through the article by Allan and Bryant, a proposal not different from that of Folke (2006), quoted above. Neither do Allan and Bryant nor Folke consider the problem or admit to the epistemological differences that may cause misunderstandings between the collaborating actors. Hill on the other hand stresses this issue and calls for attention to what is used as a scientific metaphor and what is not.

Allan and Bryant do at a first stage use the concept almost analogously with the "original" use, but as the authors thereafter

translate the term into planning strategies it also functions metaphorically – the term so to say helps the authors to view their own profession form a new horizon. Moreover, resilience thinking has over the last decades been a useful metaphor for the field of landscape architecture and has fundamentally influenced the thinking of the basic concepts of the profession, the site and the project, as shown by Hill's, Farsø's and Sieverts's examples. The non-equilibrium paradigm, which I have previously called an ontology of ecology, has in these texts also been shown to have transformed the profession and thus the issues of concern and vice versa, bringing with it new methods, hypotheses, political claims and ethics – all mixed together in the Farsø examples as an outspoken responsibility towards the site and the project.

In the case of Sieverts and his work on the Zwischenstadt and the Fragmented urban landscapes, he interprets the urban landscape based on iterative readings and suggests, like the *Resilient City* papers, cross-disciplinary and multi-layered readings of the urban landscape in order to get to know the system and to be able to implement transformations in the right time, scale and domain – to use the words from resilience thinking. Because, according to Sieverts, these fragmented urban landscapes need improving.

The term resilience has throughout the landscape architects' and theorists' descriptions above been working as an evocative metaphor, but before that, as Hill proposes, the paradigm of dynamics in ecosystems – the non-equilibrium paradigm – has fundamentally changed the landscape architect profession since the 70s, incorporating the knowledge and methods from ecology. But despite this it can also be called a metaphorical use of the term as it is transferred into the landscape architect situations/concerns and commission.

1.4 REFLECTIONS ON RESILIENCE – TOWARDS A PROJECT

1.4.1 STARTING WITH QUESTIONS

The literature review has informed this master project with resilience thinking from a range of theorists, giving a brief introduction to the term as it is used in different contexts. The next part of the thesis is a case study – a test design – where an urban fragment is used as an example site for development. The following reflection conveys further questions triggered by the reviewed texts and how the test design will be carried out.

On a site systems overlap, therefore sites are complex fragments. Ecologists need to define what their focal scale is, they need to decide where the system they study ends and begins, although systems at one point or another overlap each other. In a way, then, when systems are studied they also become fragments. Knowledge on complex systems is valuable on sites and, as both Hill and Farsø describe, landscape architecture has been influenced by the development of thinking within ecology. Also here things overlap.

I suggest that the landscape architect's use of thinking on systems and dynamics is metaphorical, as terms are picked up from one context and reinterpreted in another, given new connotations and content. As shown in the text above, landscape architect practitioners and theorists do not fully incorporate a fundamentally new epistemology into the landscape architecture field by leaving out the profession's heuristic and hermeneutic reading of landscape. Instead, value and meaning shift and displacement happens, like always in living languages, and here a foreign concept acts as a lens through which one's own thinking can be reinterpreted.

It is also possible that the influence of landscape architecture on resilience thinking contributes to and develops the term. So far there has not been any opposition to the fundamental ontological shift within ecology, "the non-equilibrium paradigm", although

Hill predicts there will always come new ontologies, hence they might simultaneously also be metaphors.

What is clear from the natural scientists above is that resilience is neither a good nor a bad thing but a property that needs to be decided on: whether the system should be resilient or transformed into a new state. When the term is used as an operative tool, methodology and hypothesis in the landscape architecture texts and in the Resilient Cities texts it appears as a goal to obtain, entirely positive. This is an issue that deserves attention. But resilience thinking can also be used as a tool in landscape architecture, as a perspective on interpreting site. This is where the similarities between the epistemologies are most obvious; in Farsø's article the exemplified practitioners and theorists show that the ontological shift within ecology has made dynamics and processes important actors in many landscape architect projects and theories, not only regarding the adaptability of the site but of the project itself. The project method of listening, learning and acting upon the site dynamics can be called a philosophical ontology: to have a gardener's mentality on the city, to always listen and learn, adjust and adapt[9]. What is requisite information of a site, then? Is it useful to ask that kind of question within the redundancy of landscape, or is the constant dynamics worthy of an adherently dynamic interpretation? Reciprocally, how does the site inform the project? Are not all iterations interpretations – one of many possible perspectives?

Resilience can also be a vision, many writers use the term that way, but resilience of what and to what, and how is it measured? When is a site adjusted to continue to function like before within the dynamics of the interlinked systems and when should a site be transformed into a fundamentally new one, with new functions, identity and feedbacks?
It takes patience to agree on these things and it demands creative judgement to communicate them across disciplines.

1.4.2 TOWARDS A PROJECT

Resilience in ecological studies is a property of a system that can be measured. The question: how resilient is this system, is then a relevant question for an ecologist. In the test design, I elaborate with the method of design and aims with the design in an urban fragment, a valley in Gothenburg, what is resilient in the test design or as a result of the test deign, if it were to be realized, can be judged only when built. The project has been informed by resilience thinking in the tree-fold way shown above, which has resulted in the following project methodology and terminology.

First of all the site *is* the project[10] (Farsø 2010) – it has developed through site interpretations and not through a commission or a limiting project question.

The *Site interpretation* starts with a process of locating sites of interest (how this is done is described in the Case study). The sites are bounded to the point that they have a certain physical location but they simultaneously exceed their boundaries, as they are composed of overlapping conflicting matters and are connected to

9. To use the garden and the gardener as a metaphor when discussing issues of space as process is current in the article by Diedrich in *´scape*, 2011 issue 2. Here Diedrich argues for the urban situation, as a Metropolitan garden " "What is important is the undogmatic and creative interplay of spatial and social structures with the professional and individual inventivity that has made these gardens possible." (2011, p. 61). Also the geographers Crang & Thrift ed. (2000) argues for in *Thinking space* that the current writing on space is turned away from an absolute category towards process and becoming, a thinking that corresponds to the possibility of being a gardener in a metaphorical sense (2000, p. 3).

10. This is regarded in the same way as Meyer quoted in the introduction "... design as site interpretation, and site as program, not surface for program" (Meyer, 2005, p. 93). For deeper reading on the subject of site, see *Site Matters* by editors Burns and Kahn (2005) and *Visits. Town and Territory – Architecture in Dialogue* by Chemetoff (2009).

networks of stakeholders.[11] Moreover, the sites are studied through their physical composition and their location in the valley, hence the drawings of sections and use of plans and photos.

I pronounce the conflicting matters through *Issues* – themes of interest and; *Considerations* – issues of concern, which will be edited through *Alterations*[12]. The use of the term *alteration* points to the possibility of the site to be altered in order to meet certain disturbances and needs, calibrating and rearranging what is already there but adding other functions/experiences, blurring the strict modernist functional division. The alterations are design strategies that are based on the aforesaid *Considerations* and consist of: *Alteration principles* – design principles that mark out the main structure of the design and, finally, a *Negotiation*. The *Negotiation* proposes a network of living and non-living actors involved in the alteration that will need to collaborate in order to make the alteration happen.

The overall method is thus the *Site Interpretation* – a suggestive and open design tactic for an urban fragment, possible to add information to and alter on the way.

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11. What is site has been closely described in the above-mentioned book *Site Matters*. In the introduction the editors Burns & Kahn (2005) develop the concept of site thinking. They conceive the site as having a threefold extension: area of control, area of influence and area of effect. The constitution of a site, when doing a design work, is then both being an area of control which refers to legal boundaries or the area defined by the commission, but the site also has an area of influence- which due to the interconnectedness of site is influencing the site, and the last extension of the area- the area of effect is what will be effected by the design act. (Burns & Kahn, 2005, pp. x-xiv) In the case study the description of the altered sites, named "Altered sites", are referring to these concepts.

12. Anstey, T. & Gabrielsson, C (2012), in their article "What we talk about when we talk about alteration", suggest the need for a theory of alteration within architecture to describe projects engaged with adjustment. In *Nordic Journal of Architecture* No 3. Vol 2. Se also footnote 10.

2 CASE STUDY/ EXPERIMENTING WITH RESILIENCE IN LANDSCAPE ARCHITECTURE: TEST DESIGN FOR THE EXTENDED VÄLEN -FRÖLUNDA VALLEY, GOTHENBURG

2.1 SITE INTERPRETATION

Site Interpretation is an overall design tactics for this test design. It is a suggestive and open design strategy for the urban fragment, the Välen-Frölunda valley.

Site Interpretation is a design in itself, that includes a selection process through which issues of concern are developed. These concerns are then guiding the additions and adjustments suggested which are namned Site Alterations. These Site Alterations are shown in the second part of the test design, 2.2 Site Alteration.

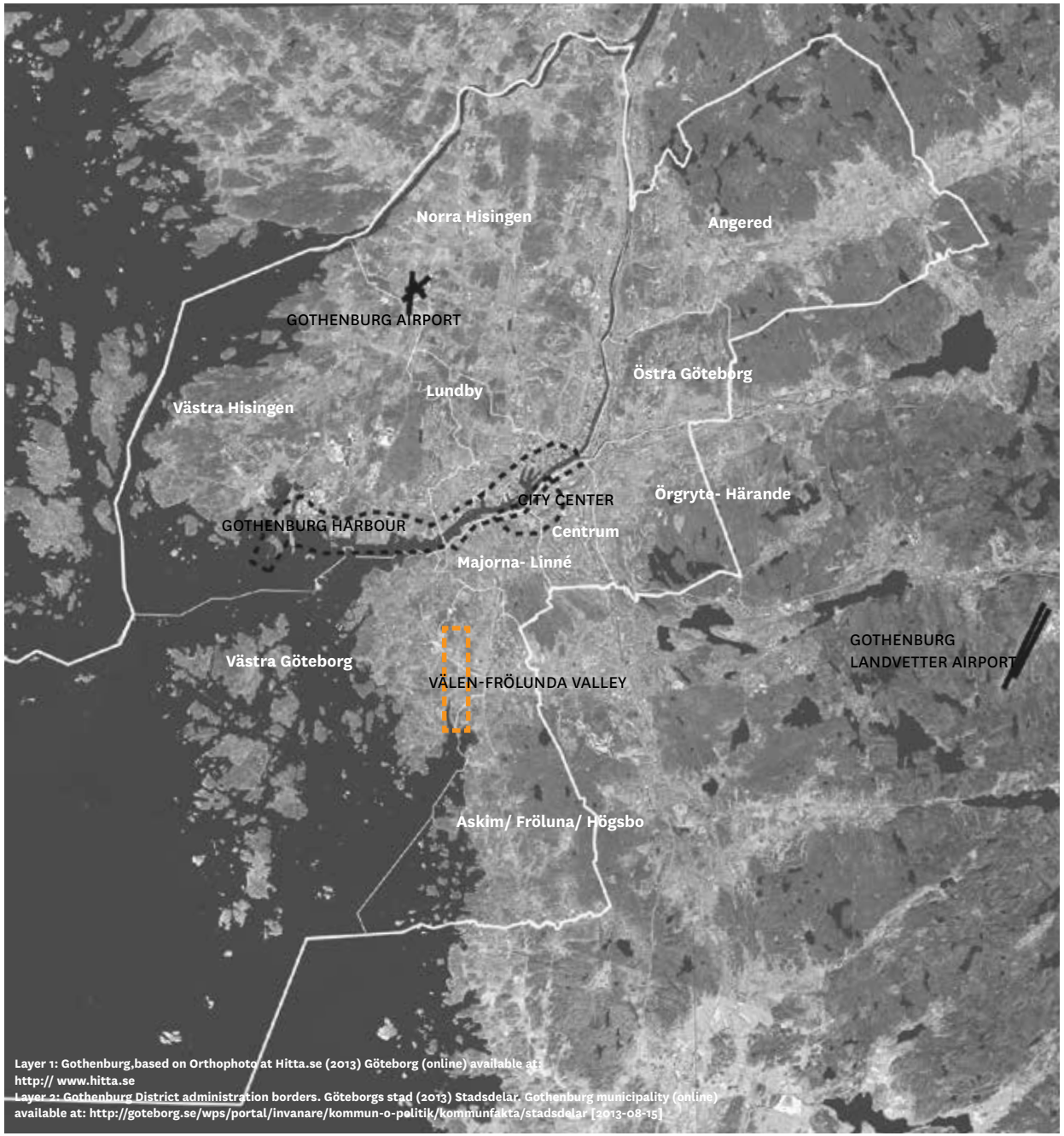
The test design is an experiment, possible to add information to and to alter on the way and it is an invitation for discussion.

LOCATION OF THE TEST DESIGN

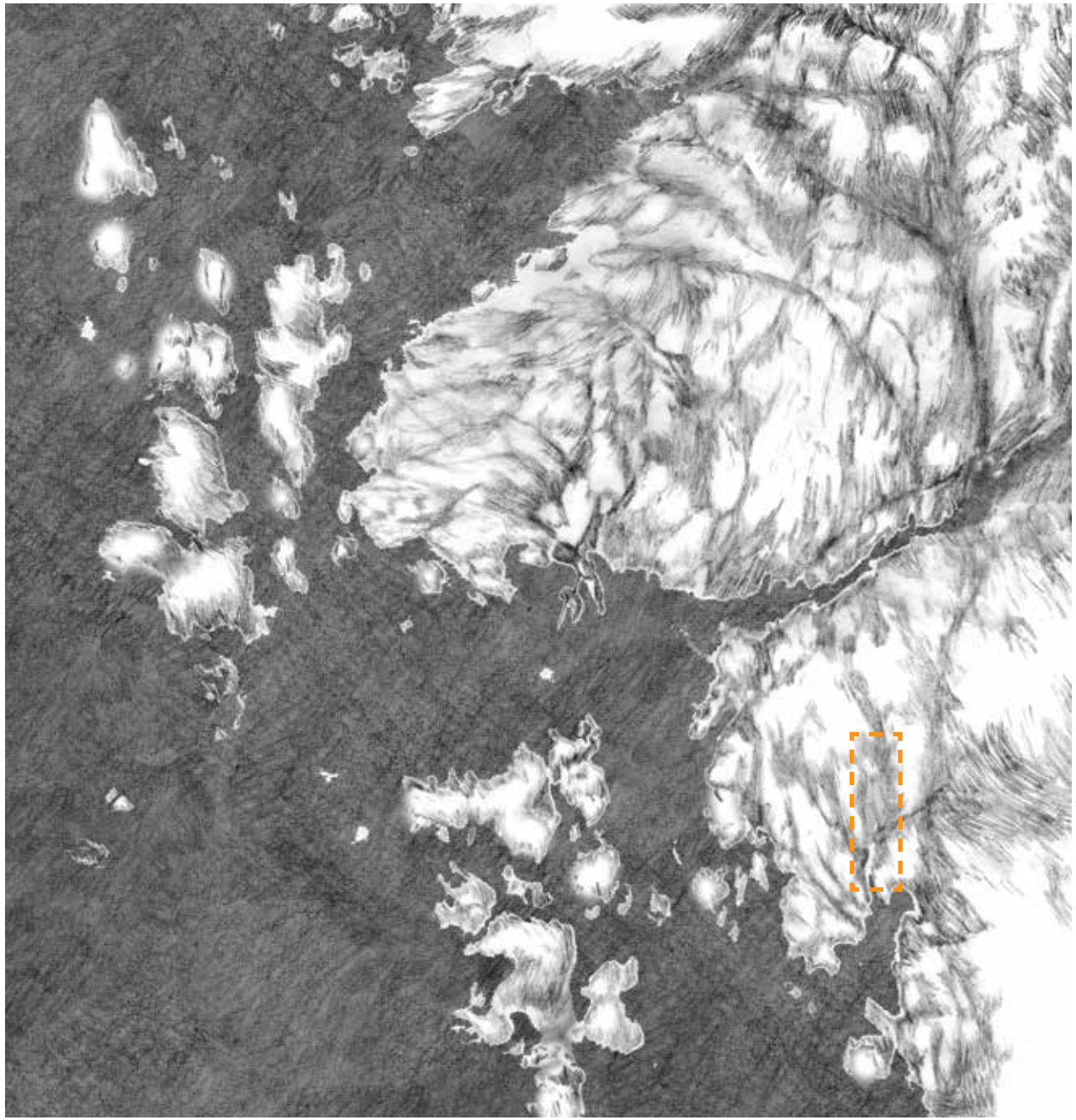
Gothenburg, (in swedish Göteborg) is situated on the Swedish west coast at the mouth of the river, Göta Älv. In the 1700th century the city was founded, due to its possibilities of hosting harbour activities, on what was once a delta marshland surrounded by rocky hills and the coast line archipelago. Today Scandinavia's biggest industry groups have located their factories in the municipality strategically close to the coherently most important harbour in Scandinavia. The main biotope is pine forest on rocky hills as both infrastructure, main roads and railroads, together with housing has developed from the city centre outwards through the fertile, once farmed, valleys.

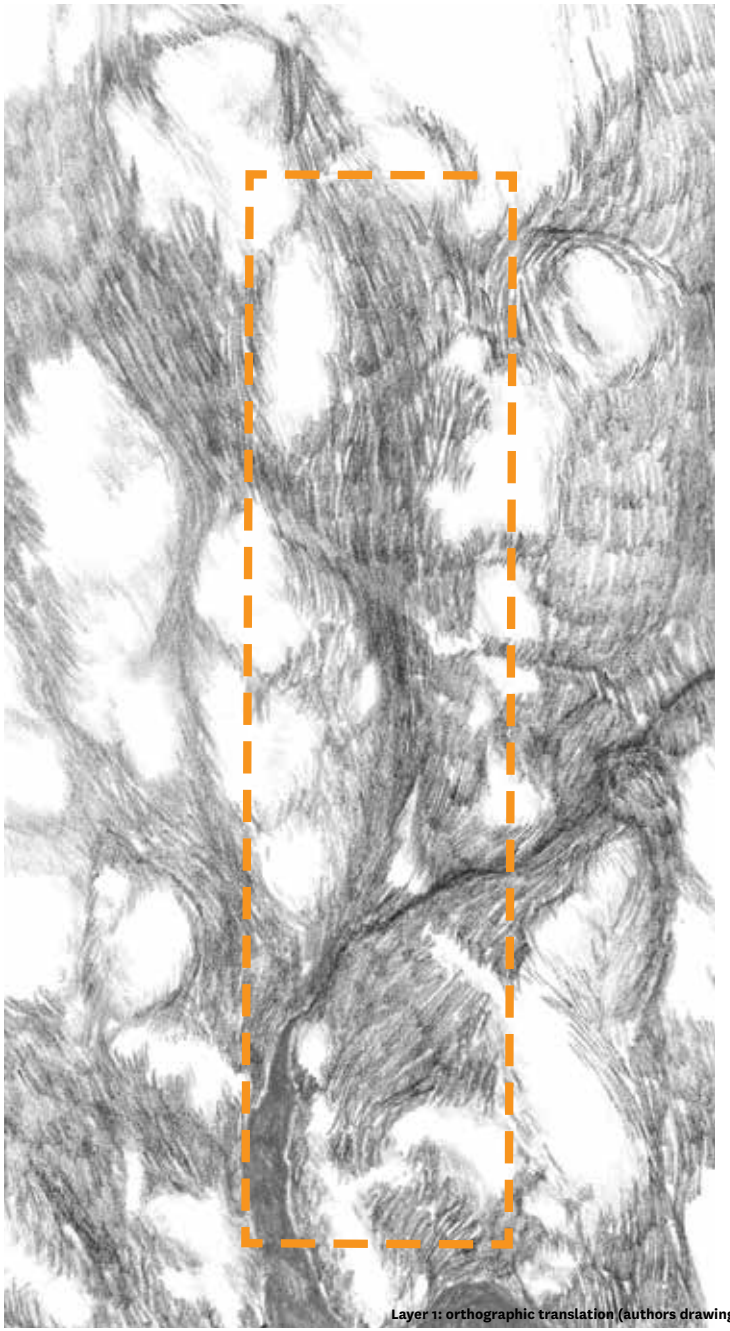
Gothenburg is the second largest city in Sweden, with its 526 054 inhabitants (statistics from the 31st Dec. 2012). The city is the node of a larger region called Storgöteborg, Large Gothenburg, a region soon reaching 1 million inhabitants. The municipality itself is 450 km^2 and divided into 10 administrative areas. The extended Välen-Frölunda valley, is a geographical delimited area, starting with the Välen bay in the south and streches to the north crossing Frölunda Center and stops by the Flatås hills in the north. It is a valley in the south western part of the city,but the naming and the delimitation is an interpretation within this project.

Gothenburg is at the moment like many expanding urban regions, exploring the contradictory forces of
urbanity: increased commuting and urban densification - more people and more built areas, together with the challenges of climate change.



Layer 1: Gothenburg,based on Orthophoto at Hitta.se (2013) Göteborg (online) available at: http:// www.hitta.se
Layer 2: Gothenburg District administration borders. Göteborgs stad (2013) Stadsdelar. Gothenburg municipality (online) available at: http://goteborg.se/wps/portal/invanare/kommun-o-politik/kommunfakta/stadsdelar [2013-08-15]





Layer 1: orthographic translation (authors drawing)

SITE KNOWLEDGE AND SITE SELECTION

The following interpretation of the Välen-Frölunda valley has been done after a month´s work on building up knowledge of the area. This preparatory work included site visits (23rd January, 15th February, 20-21th March), meetings with municipal officials: Stella Ohlsson Svanberg, landscape architect, Gothenburg Planning Administration (11th April), Lukas Memborn, city planner and architect, Gothenburg Planning Administration (12th April), and Ulf Täng, project manager Gothenburg Planning Administration (15th April).

The Välen area was introduced by Yngve Karlsson, housing developer (20th March) and Erik Berg at the architect office Inobi. Together with Emma Larrouy, Josefin Rhedin, Katarina Rosengren , architect student at Chalmers Technical University College of Architecture and Erik Berg at Inobi, seminars on resilience has been executed throughout the spring(7th & 23rd January, 6th , 15th,28th February, 19th March, 10th ,25th April, 8th May) due to Inobi's research project "Resilience Quarters" funded by the "Delegation for Sustainable Cities". The seminars have included text studies and lectures on the themes of sustainable housing, planning and urban farming.

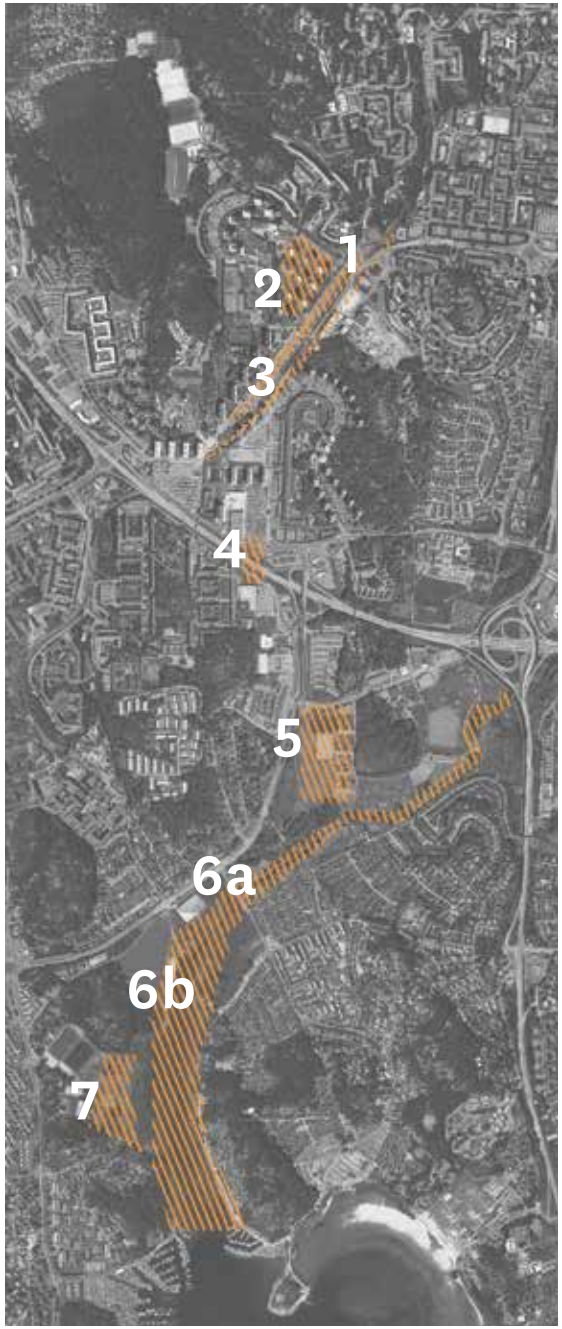
Studies at Gothenburg City Museum archive and Gothenburg Map Administration (10-11th April) has provided information on the historical development of the area. For contemporary tendencies in the region and in Scandinavia, participation at the landscape architect seminar "Till (rätta) lägga" (26th April), and a visit at the exhibition and competition "Fremtidens forstæder" (Danish Architectural Center) provided useful information.
The sites selected enhanced certain conflicting matters, for example how climate change, polluted soil and stormwater issues, are handled in future plans of the area and in related policy documents. At the same time these sites have the potential for a more resilient planning, something that is experiment on through this design work.

The rocky Gothenburg landscape consists of hills and valleys. Välen Viken- The Välen Bay and Frölunda are situated in one of these long valleys. The studied sites are situated in the valley and by drawing horizontal lines through the valley cutting through each site, the spatial and temporal depth is interpreted. The specific sections are selected to be able to describe variation in the valley.

The interpretation of the "extended Välen-Frölunda valley" , is based on shifting scales, time dynamics and themes of interest. This test design suggests a perspective of interpreting and altering a number of sites. Each interpretation and thus alteration implicates a larger effect, then the geographical location, due to their interconnectedness with a larger whole.

To clarify the reading of the following test design: The *Temporality/ Functionality Sections* pictures the time-depth of the main structures and species found. In the *Spatiality Sections*, the height:lenght proportions are 2:1. "First valley", refers to the topographical valley; "second valley", is the current open area that is not constructed by housing. The term *trajectory*, refers to resilience thinking, asking "what trajectory is the system on?", here this means the path or course the current situation is on.

All maps used are marked with the original source and the changed made or enhancements drawn. All photos are taken by the author unless marked with reference.



SITES

1 MANDOLINGATAN PARKINGLOT
2 MANDOLINGATAN COURT YARD
3 MUSIKVÄGEN -POSITIVGATAN TRAM LINE
4 VÄSTERLEDEN UNDERPASS
5 VÄLEN FOOTBALL FIELD
6a-b THE CREAK STORA ÅN,THE BAY VÄLEN VIKEN
7 VÄLEN LANDFILL

Layer 1: Ortophoto Välen -Frölunda (2013) Map archive, Chalmers University of Technology, Dep. of Architecture Gothenburg.

Layer 1: Ortophoto Välen -Frölunda (2013) Map archive, Chalmers University of Technology, Dep. of Architecture Gothenburg.
Layer 2: authors drawing

SITE 1 MADOLINGATAN PARKING LOT

Layer 1: Ortophoto Välen -Frölunda (2013) Map archive, Chalmers University of Technology, Dep. of Architecture Gothenburg.
Layer 2: Topography, Gothenburg primary map,(2013) Map archive, Chalmers University of Technology, Dep. of Architecture Gothenburg.
layer 3: Section-window and site (authors drawing)

SECTIONS & PLAN

TEMPORALITY / FUNCTIONALITY

Biotope: pine forest on bare rock:
Tree layer: Pinus sylvestris
Shrub layer/lower tree layer: Sorbus intermedia, Querqus petraea, Corylus avellana
Fliedlayer: Lonicera peryclemenum, Vaccinium myrtillus, Frangula alnus
The edge: Querqus petraea,Sorbus intermedia, Corylus avellana

Prehistoric settlements 1800-500 BC

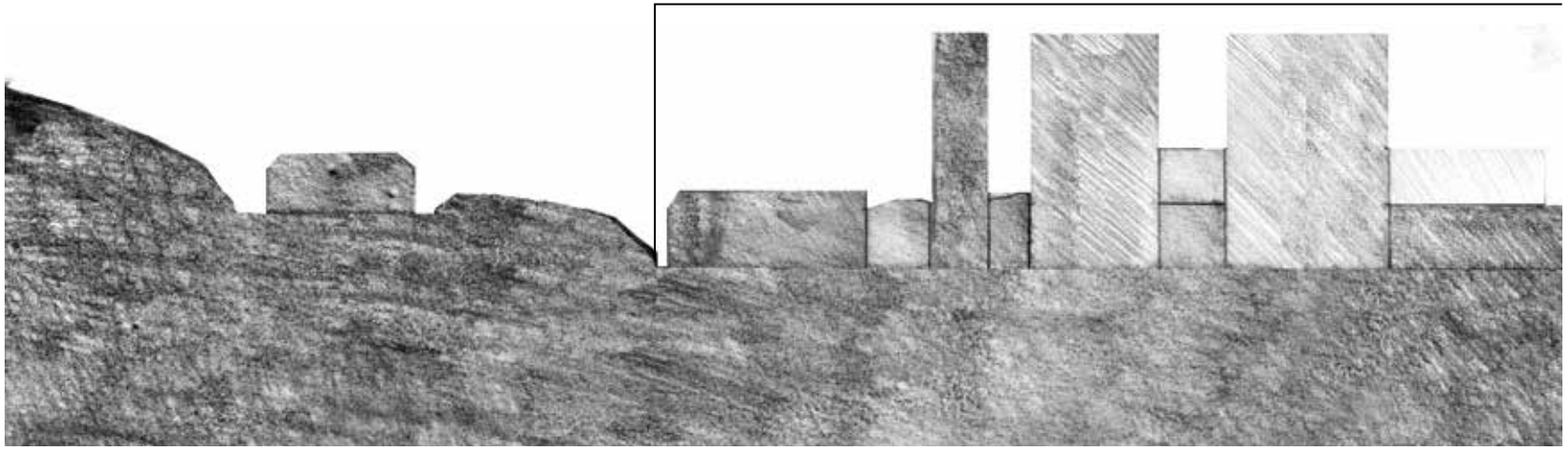
Rudhallen - indoors ice skating rink
Building year 2002

Condominium Musikvägen
Building year 1963

Condominium Fiolgatan
Bulding year 1962

Park with solitary trees and shrubs, and small perennial plantings

SPATIALITY



PLAN

Layer 1: Orthophoto (2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 2: Topography, Gothenburg primary map,(2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 3: Section-window and site (authors drawing)

Parkin lots and garages for Condominium tenants Fiolgatan

Carwash at Mandolingatan

Thai restaurant “Kins Thai Kök”

Tram viaduct

Roundabout planting: Park like biotope; Tree layer Aesculus hippocastanum Fieldlayer: grass, herbs

Housing area from the 50s

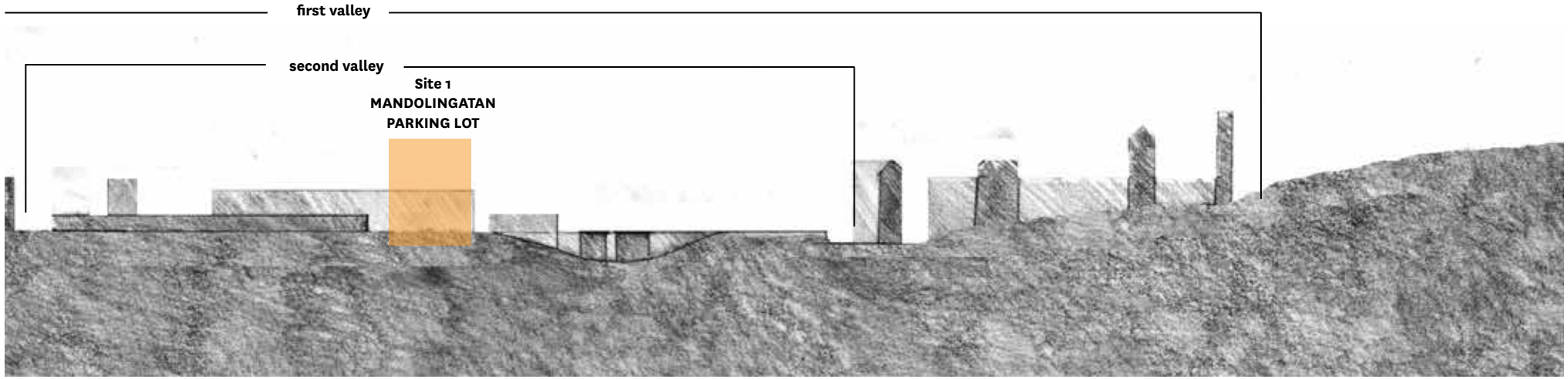
Park with solitary trees and shrubs, and small perennial plantings

Experimenthouses with movable walls Modulatorsgatan Builing year 1951-53

Biotope: pine forest on bare rock: Tree layer: Pinus sylvestris Shrub layer/lower tree layer: sorbus intermedia, Betula ssp, Sorbus aucuparia, Sorbus intermedia, Cotoneaster ssp.

Site 1
MANDOLINGATAN
PARKING LOT

Stone circle
500 BC - 10500

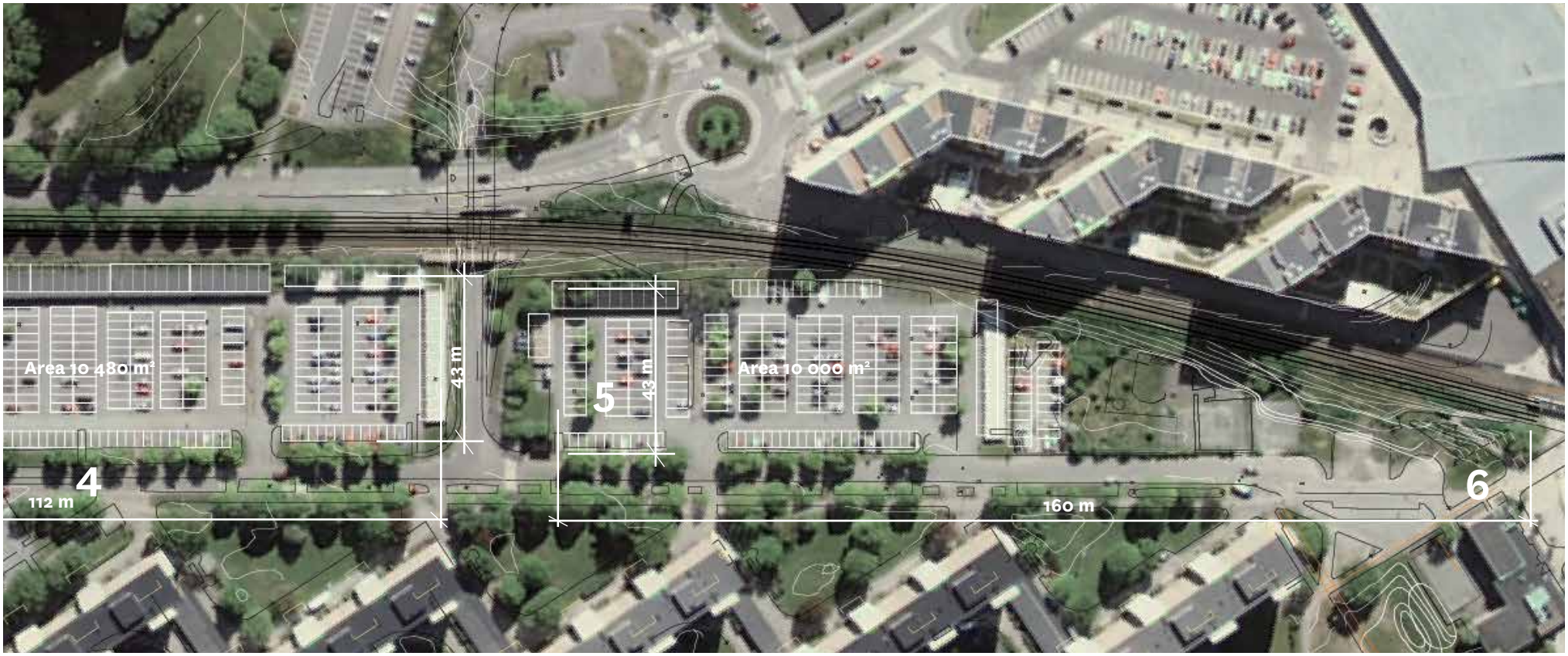


MADOLINGATAN PARKING LOT

Area 30 240 m². 3 ha

In the centre of the constructed valley, the spatial openness is preserved as the area is filled with a band of parking lots.

Mandolingatan: a straight street aligned with the block houses and the garages, that are turning their front sides away from the street.



The southern part of Mandolingatan is planted with Tilia ssp. , making the street less windy and thus more confortable to walk along.

In the most southern part of the parking lot-area there is a temporary parking lot as the space soon is to be exploited for housing.

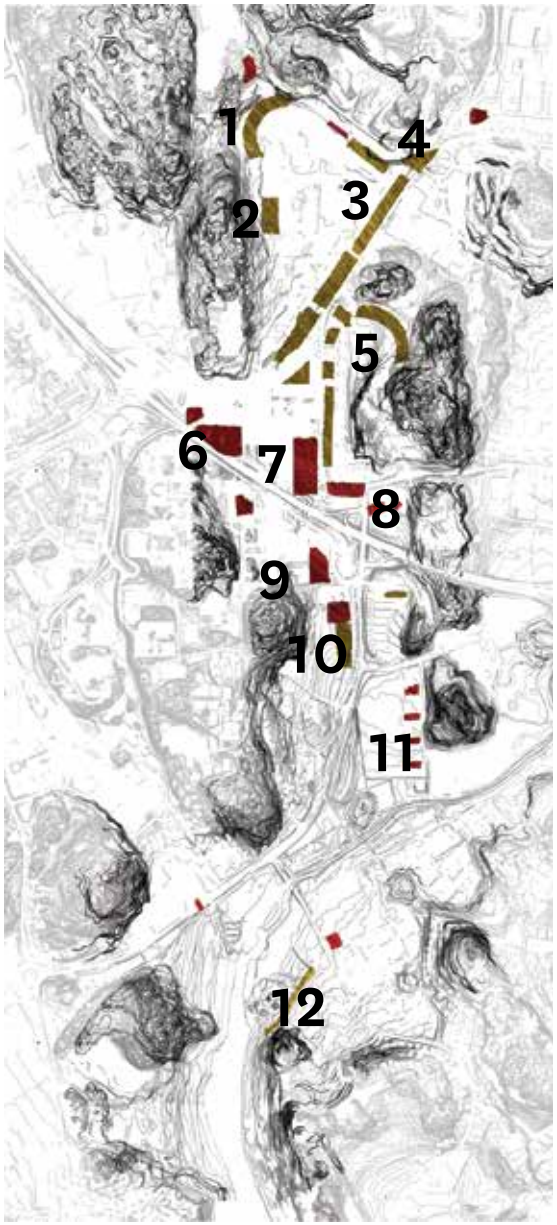
Layer 1: Orthophoto (2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 2: excerpts from Topography, Gothenburg primary map,(2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 3: Parking lots and garages (authors drawing)

ISSUE GROUND STORM WATER

PARKING SPACES

The parking lots are situated in the low point, the centre of the valley. This area of parking lots is flexible over time. The parking lots for the inhabitants are filled in the night-time and the parking lots to the mall or stores are filled during day-time. Parking lots to the club houses and the allotment gardens also vary over the season and the day.

As the parking lots are placed centrally in the valley they retain the openness of the valley, creating an inner valley within the topographical valley. Although the parking lots are flexible and open space they are sealed surafaces, that do not allow stormwater to infiltrate locally.



Layer 1: Topography and parking lots, Gothenburg primary map,(2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 2: Enhanced parking lots (authors drawing)
Layer 3: Enhanced topography (authors drawing)

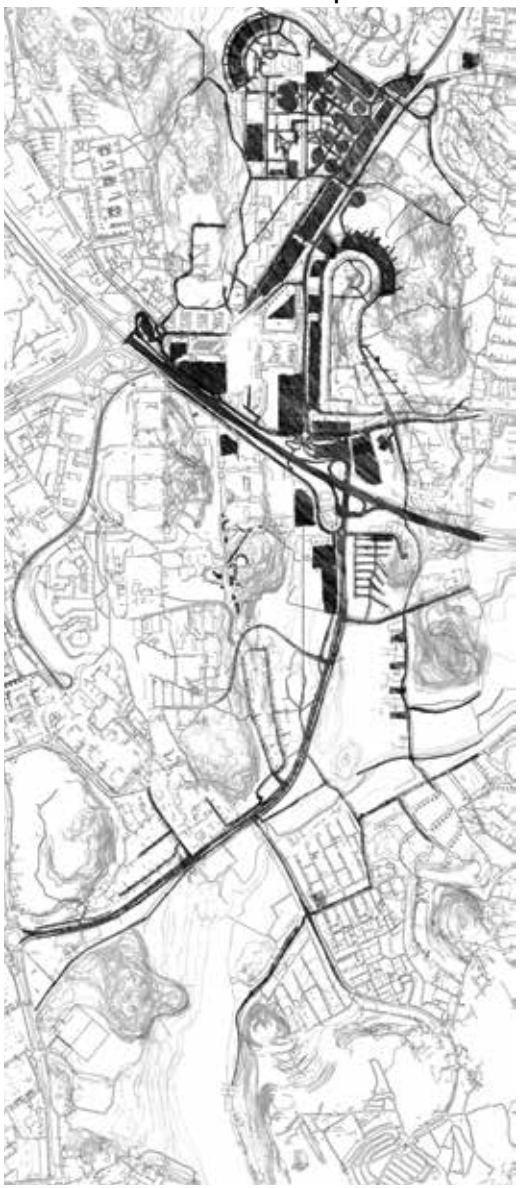
Parking lots for tenants

Parking lots for the shopping centre

Parking lots for house owners

Parking lots for the sports fields and allotment gardens

Sealed surfaces: roads and parking lots. The stormwater from these surfaces are polluted.

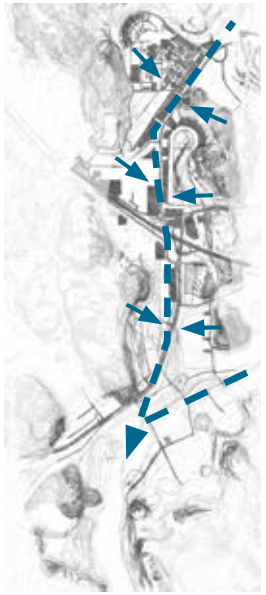


Sealed surfaces: roofs. The stormwater from these surfaces are not polluted.

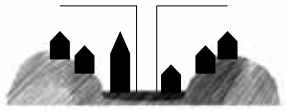
The northern part of the valley is filled with, sealed surfaces such as roads and parking lots.

IS IT POSSIBLE TO USE THE PARKING LOTS AS THEY ARE CENTRED IN THE VALLEY AND ARE OPEN SPACES IN A MORE FLEXIBLE WAY?

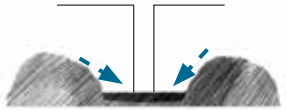
HOW IS IT POSSIBLE TO USE THE POLLUTED GROUND STORM WATER AS A RESOURCE WITHIN THE VALLEY?



PARKING LOTS/ SEALED SURFACES ARE LOCATED IN THE CENTRE OF THE VALLEY



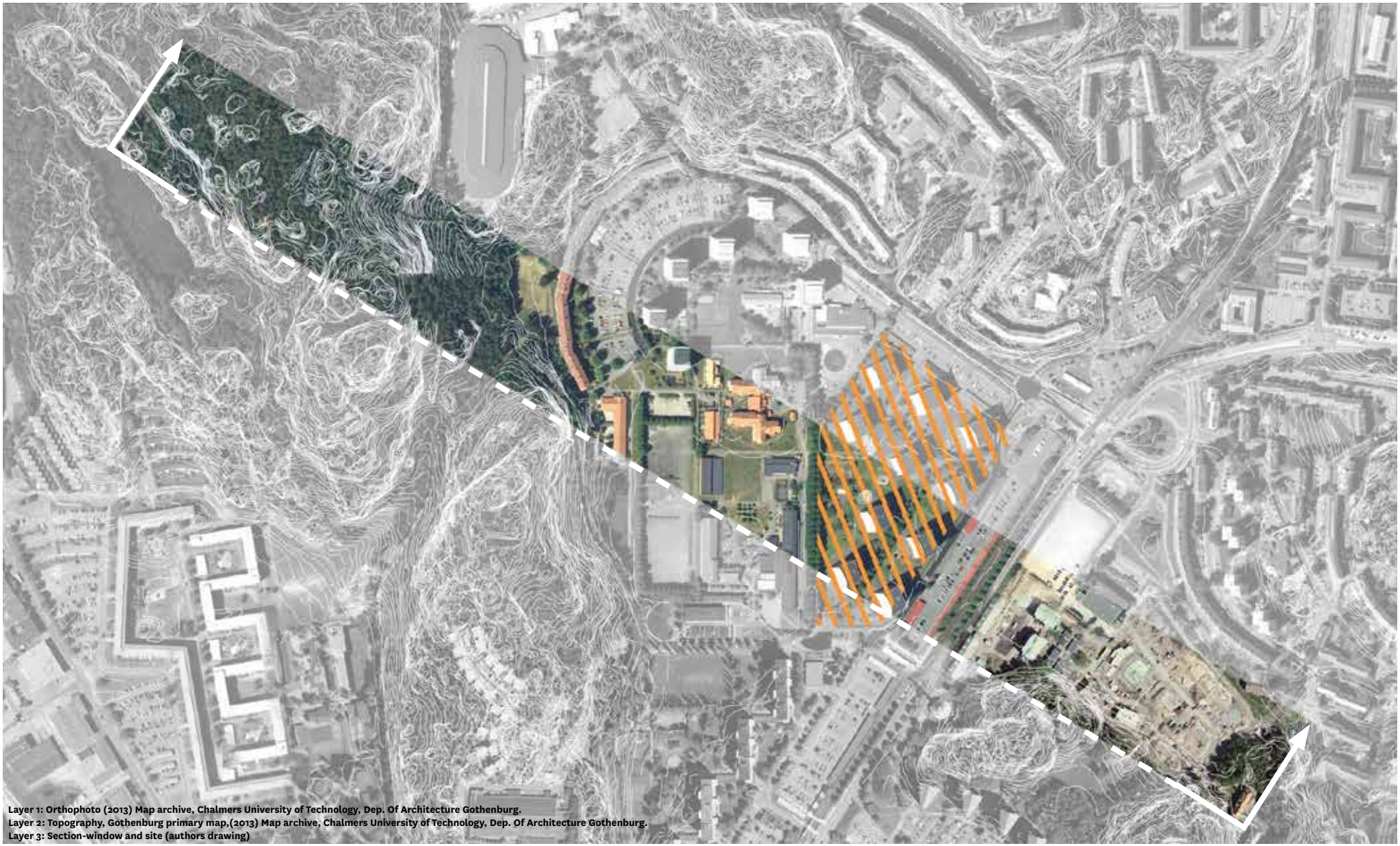
THE CENTRE OF THE VALLEY IS ALSO THE LOW POINT FROM WHERE THE WATER NEEDS TO BE TRANSPORTED TO THE RECIPIENT



Layer 1: Topography, parking lots,roofs, Gothenburg primary map,(2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 2: Enhanced parking lots,roads, roofs (authors drawing)
Layer 3: Enhanced topography (authors drawing)

Layer 1: Ortophoto Välen -Frölunda (2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 2: authors drawing

SITE 2 MANDOLINGATAN COURT YARD



Layer 1: Orthophoto (2013) Map archive, Chalmers University of Technology. Dep. Of Architecture Gothenburg.
Layer 2: Topography, Gothenburg primary map,(2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 3: Section-window and site (authors drawing)

SECTIONS & PLAN

TEMPORALITY / FUNCTIONALITY

Biotope: pine forest on bare rock:
Tree layer: Pinus sylvestris, Populus tremula
Shrub layer/lower tree layer: Sorbus intermedia, Querqus petraea, Corylus avellana
Flied layer: Lonicera periclymenum, Vaccinium myrtillus, Frangula alnus

Grave setting
1800-500 BC

Informal settlement
2013

Bicycleway

Row houses
Äppelträdgården
Bulding year 2011

Kindergarten:
Fiolgatans förskola &
Parents co-operative
Barnlåten

Condominium
Fiolgatan
Bulding year 1962

Service flats for elderly people
Altplatsens äldreboende
Buildt in the 2000s

Kindergarten

SPATIALITY

PLAN

Layer 1: Orthophoto (2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 2: Topography, Gothenburg primary map,(2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 3: Section-window and site (authors drawing)

Condominium
Mandolingatan
Building year 1960

Site 2
MANDOLINGATAN COURTYARD

Garages and
paringlots to the
condominium
Mandolingatan

Tramline
1,7 & 8

Marconigatan
Tilia ssp. tree
row

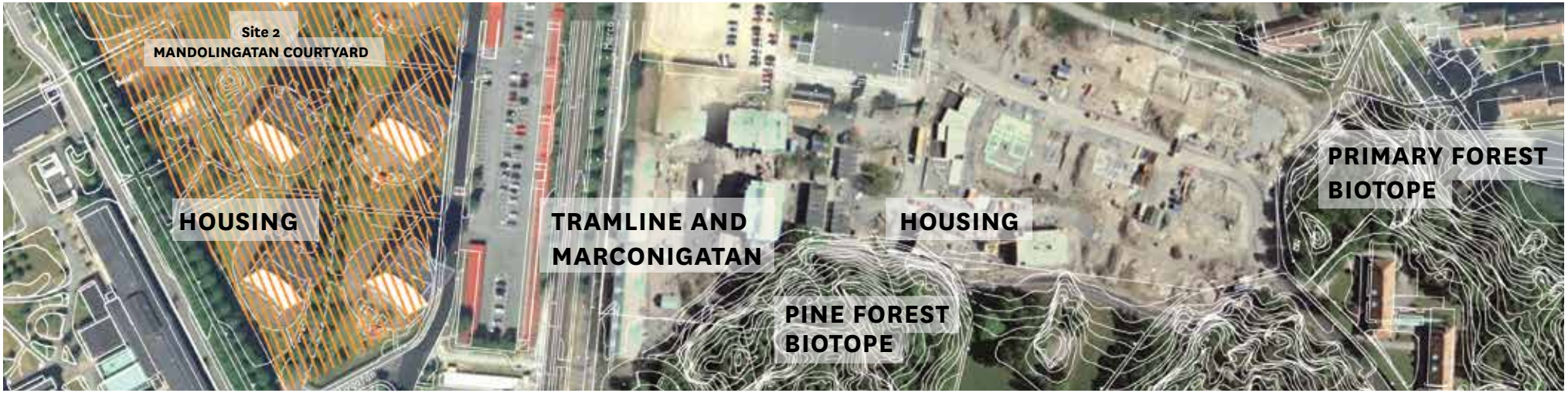
Condominium flats, appartements, row
houses, kindergarten, ice-skating rink
Marconigatan
Building site

Biotope: decidous
forest on rocky
ground
tree layer:
Querqus petraea,
Populus tremula

first valley

Site 2
MANDOLINGATAN COURTYARD

second valley



Layer 1: Orthophoto (2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 2: Excerpts of topography, Gothenburg primary map,(2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 3:Distances, authors drawing

1

The Mandolingatan condominium consists of blockhouses in a grass lane. A small hedge act the boarder towards the Mandolingatan street.

2

Small containers of perennials are placed in front of the entrances of each house.

3

View from the entrance, showing the neighbour houses, Mandolingatan and the Mandolingatan parking lots.

4

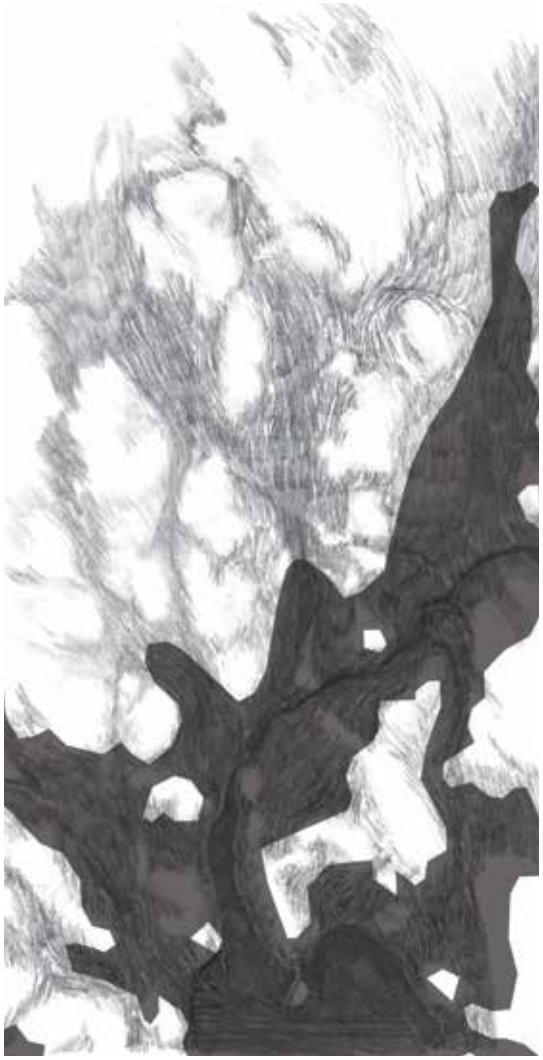
Straight asphalt paths connect the houses with each other and the area with the surrounding. The main road through the area is a Tilia ssp. alley

5

Newly planted trees and small grass hills are placed in the south easter part of the area.

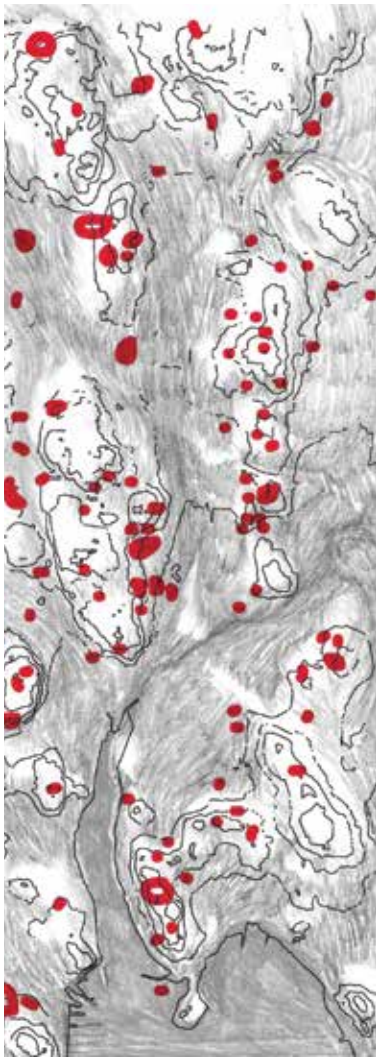
ISSUE ROOFTOP STORMWATER

8000 years ago
Water levels have been fluctuating due to ice melting and elevation of the land



Layer 1: Topographic interpretation, authors drawing
Layer 2: interpretation of map of the coastline during the stone age in Västra Frölunda, sea level +15 m (1988)
Bilder från Västra Frölunda . Göteborg: Västra Frölunda Hembygdsförening

500 BC -1050
Settlements, graves and stone circles from the stone age, bronze age, iron age are all located on the hill tops.

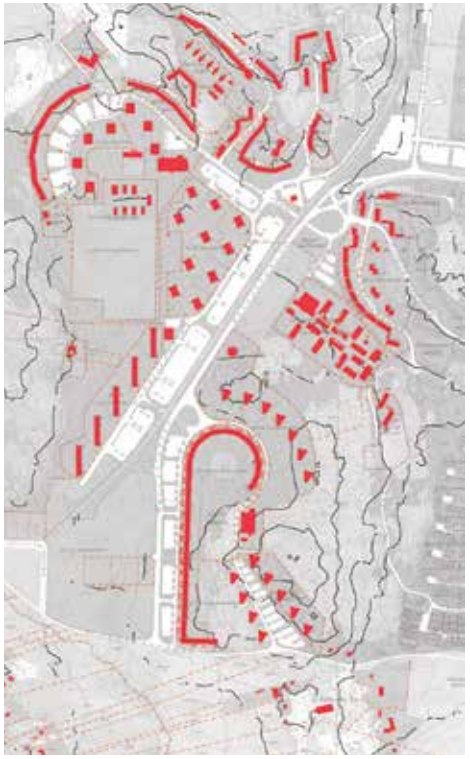


Layer 1: Topographic interpretation, authors drawing
layer 2: Topography , Översiktplan, ÖP (2009) Göteborgs Översiktsplan 2009. Gothenburg: Gothenburg municipality
Layer 3: Settlements according to Riksantikvarieämbetet, RAA (2013) Fornsök (online) available at: http://www.fmis.raa.se/cocoon/fornsok/search.html [2013-07-20]

1923
Farming settlements are situated in the border of the valley, between agricultural farmland and grazed hills. Allowing the valley to retain water.

Layer 1: Topographic interpretation, authors drawing
layer 2: Topography , Översiktplan, ÖP (2009) Göteborgs Översiktsplan 2009. Gothenburg: Gothenburg municipality
Layer 3: Frölunda socken 1923, Arkivet för bygg, plan och lantmäteri (2013) Frölunda socken 1923. Gothenburg: Gothenburg municipality
Layer 4: Enhancement of housing and crop and farmland boarders, authors drawing

1963
Gothenburg municipality expropriated farmland in order to build the new block house-area Frölunda , in the middle of the valley. The area was ditched out and rooftop water was piped or drained in underground systems.

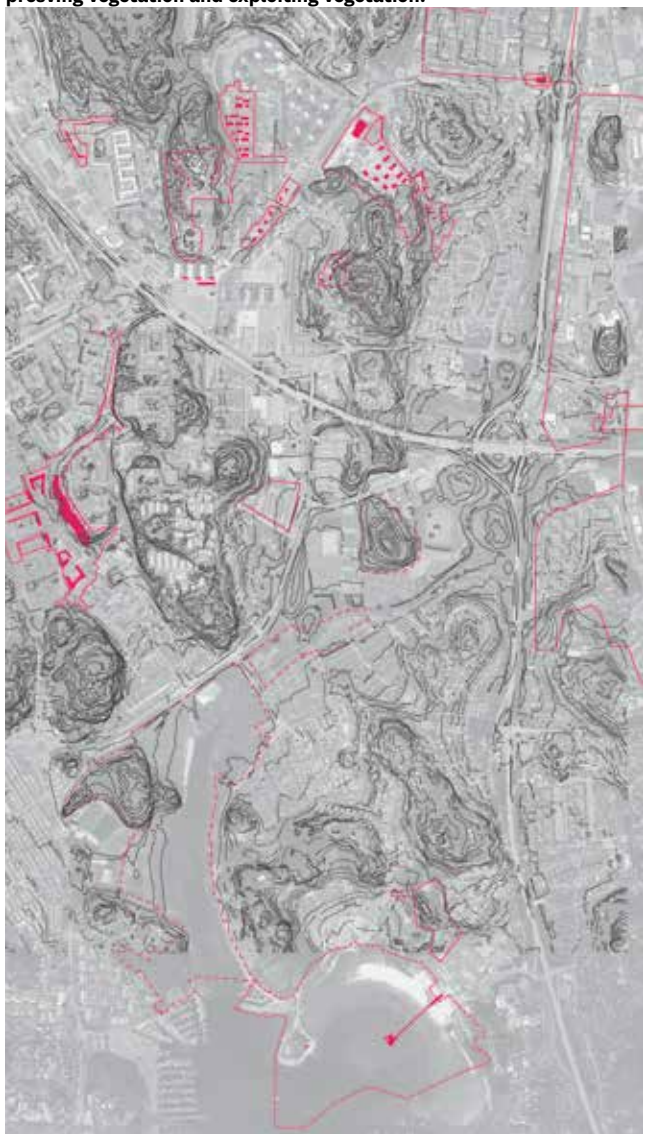


Layer 1: Topographic interpretation, authors drawing
layer 2: Topography , Översiktplan, ÖP (2009) Göteborgs Översiktsplan 2009. Gothenburg: Gothenburg municipality
Layer 3: Frölunda socken 1963, Arkivet för bygg, plan och lantmäteri (2013) Frölunda socken 1963. Gothenburg: Gothenburg municipality
Layer 4: Enhancement of housing, authors drawing

2013
Today housing is filling up both the valley and the hills.

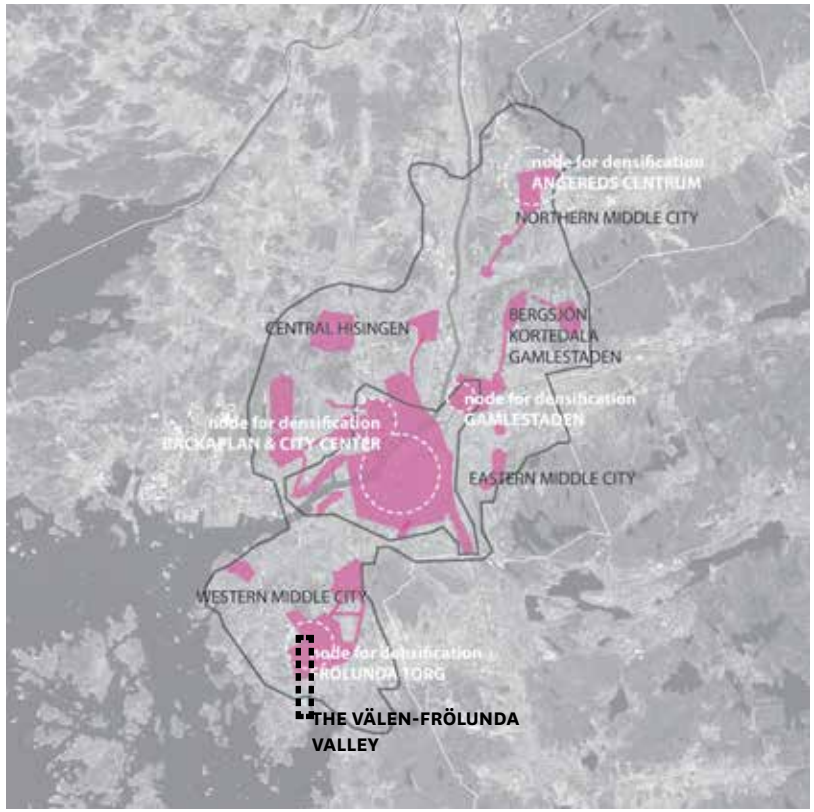
Layer 1: Topographic interpretation, authors drawing
layer 2: Topography , Översiktplan, ÖP (2009) Göteborgs Översiktsplan 2009. Gothenburg: Gothenburg municipality
Layer 3: Excerpts of topography, Gothenburg primary map,(2013) Map archive, Chalmers University of Technology, Dep. of Architecture Gothenburg.
Layer 4: Enhancement of housing and landauthorsership - boarders, authors drawing

Trajectory 2013-2018
Gothenburg municipalities´ on-going and planned buildings and nature reserves (dashed line). The current planning is twofold both presving vegetation and exploiting vegetation.



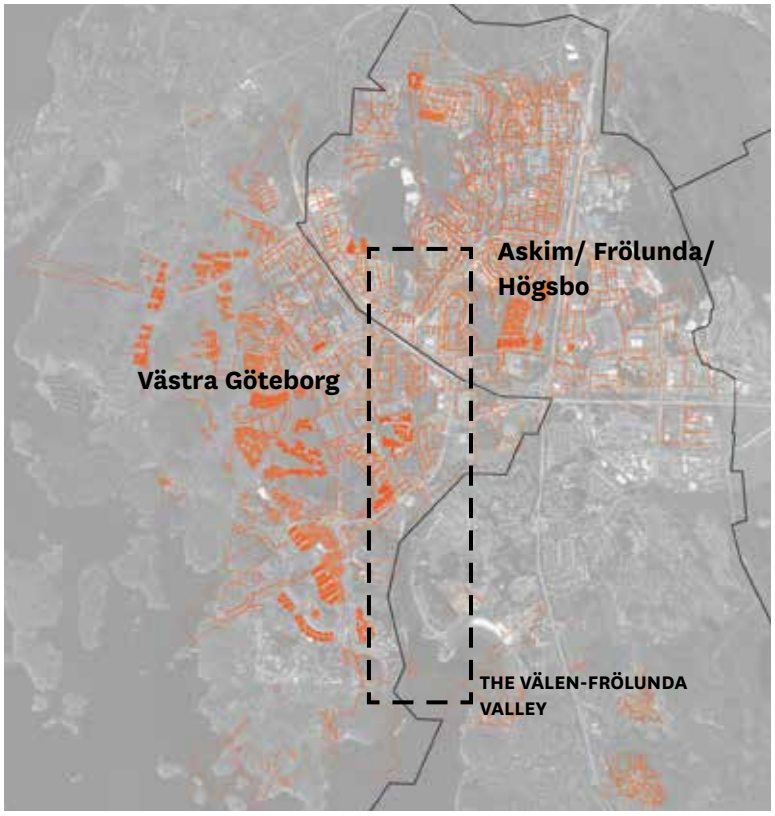
Layer 1: Topographic interpretation, authors drawing
layer 2: Topography , Översiktplan, ÖP (2009) Göteborgs Översiktsplan 2009. Gothenburg: Gothenburg municipality
Layer 3: Excerpts of topography, Gothenburg primary map,(2013) Map archive, Chalmers University of Technology, Dep. of Architecture Gothenburg.
Layer 4: On-going plans according to Gothenburg municipality (2013) Aktuella plan- och byggproject. (online) available at: http://goteborg.se/wps/portal/invanare/bygga-o-bo/kommunens-planarbete/plan--och-byggprojekt/[2013-01-30 - 2013-07-30]

Trajectory: city development 2035
Gothenburg municiplality´development nodes. Where Frölunda center is marked out as a node for densification and public transport.



Layer 1: Gothenburg,based on Orthophoto at Hitta.se (2013) Göteborg (online) available at: http:// www.hitta.se
layer 2: Interpretations of development areas for Gothenburg. Götebors stad (2013) Standsutveckling 2035. Gothenburg municiplaity(online) available at: http://goteborg.se/wps/portal/enheter/projekt/stadsutveckling-2035/ [2013-08-15]

2013
The municipality owns (orange outlines) a high procentage of the land in the northern part of the valley.



Layer 1: Gothenburg,based on Orthophoto at Hitta.se (2013) Göteborg (online) available at: http:// www.hitta.se layer 2: Land authorsed by Gothenburg municipality. Geodataavdelningen Göteborgs stad (2013) Kommunägd mark i Askim/Frölunda/Högsbo and Västra Göteborg. Göteborgs stad.

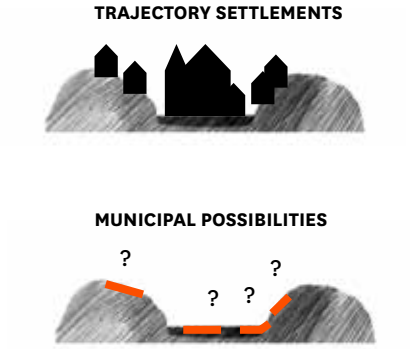
ROOFTOP STORMWATER

Since the first settlements occurred in the area the valley has been densified. First done by the farmer settlements,locating their houses in the land between farmland and rocky hills. Modern planning included an expropriation of the farmland and the new Frölunda centre was established in the centre of the northern part of the valley. Today Frölunda centre and its nearest surrounding is chosen to be even more densified, as one of a number of development nodes in Gothenburg.

As the city owns a lot of land, there are possibilities to direct the development beyond the conventional municipal planning policies. One of these possibilities are how to handle sealing of surfaces and stormwater.

WHEN BUILDING MORE HOUSES, MORE LAND IS SEALED, HOW IS IT POSSIBLE TO TAKE CARE OF THE ROOF TOP STORMWATER, AS IT IS A NON-POLLUTED WATER RECOURSE?

HOW CAN BOTH THE MUNICIPALITY AND THE PRIVATE LAND-OWNERS WORK WITH THE EXISTING AND THE NEW BUILT HOUSES TO TAKE CARE OF THE ROOF TOP STORMWATER?



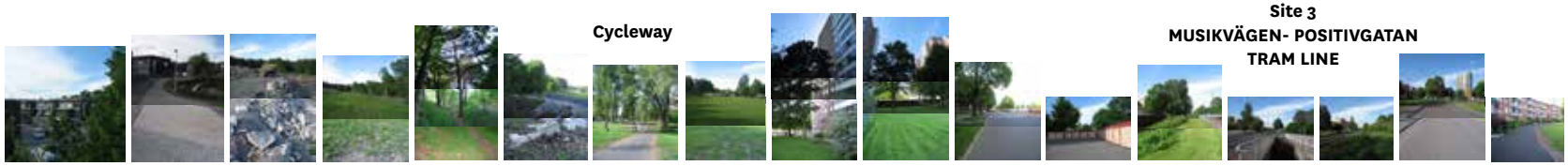
Layer 1: Ortophoto Välen -Frölunda (2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 2: authors drawing

SITE 3 MUSIKVÄGEN-POSITIVGATAN TRAM LINE

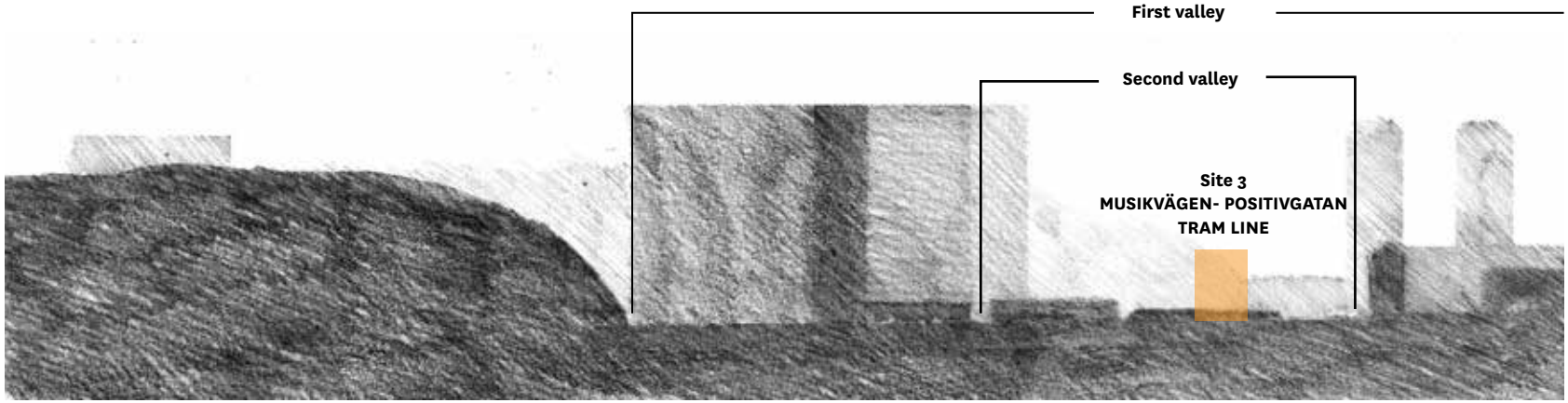
Layer 1: Orthophoto (2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 2: Topography, Gothenburg primary map,(2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 3: Section-window and site (authors drawing)

SECTIONS & PLAN

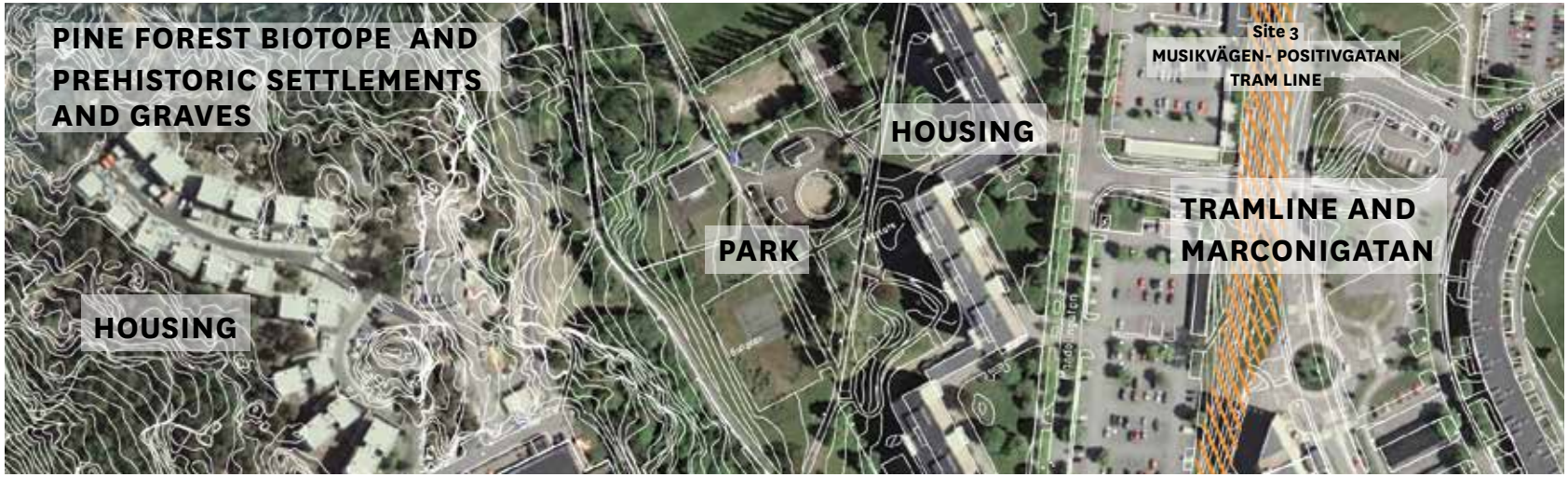
TEMPORALITY / FUNCTIONALITY



SPATIALITY



PLAN

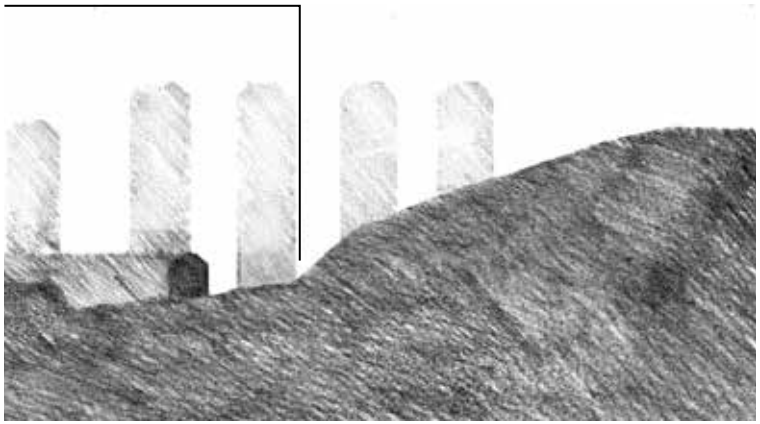


“Käppen” - Rental appartements
Pianogatan
Built, 1962, 1963 &1968

Condominium flats and rental apartments
Dragspelsgatan
Built 2012

Biotope: pine forest on bare rock:
Tree layer: Pinus sylvestris
Fieldlayer: Lonicera peryclemenum, Vaccinium myrtillus
The edge: Querqus petraea

Stone circle
500 BC - 10500



Layer 1: Orthophoto (2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 2: Topography, Gothenburg primary map,(2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 3: Section-window and site (authors drawing)







1

Tram stop Musikvägen. The tram line is fenced off along the whole stretch. Ruderal species inhabit the slopes along the line. The main species are Urtica dioca, Aegopodium podagraria and Taraxacum ssp.






2

There is a Tilia ssp. alley along Marconigatan, which acts as a boarder to the tram line area.

Layer 1: Orthophoto (2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 2: excerpts from Topography, Gothenburg primary map,(2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 3: Distances, authors drawing

3

Tramstop: Positivgatan. The tram line is fenced off along the whole stretch. Ruderal species inhabit the slopes along the line. The main species are Urtica dioca, Aegopodium podagraria and Taraxacum ssp.

4 & 5

The tramline stops at Frölunda centre. Here the tram line is elevated.

ISSUE PUBLIC SPACE NETWORK

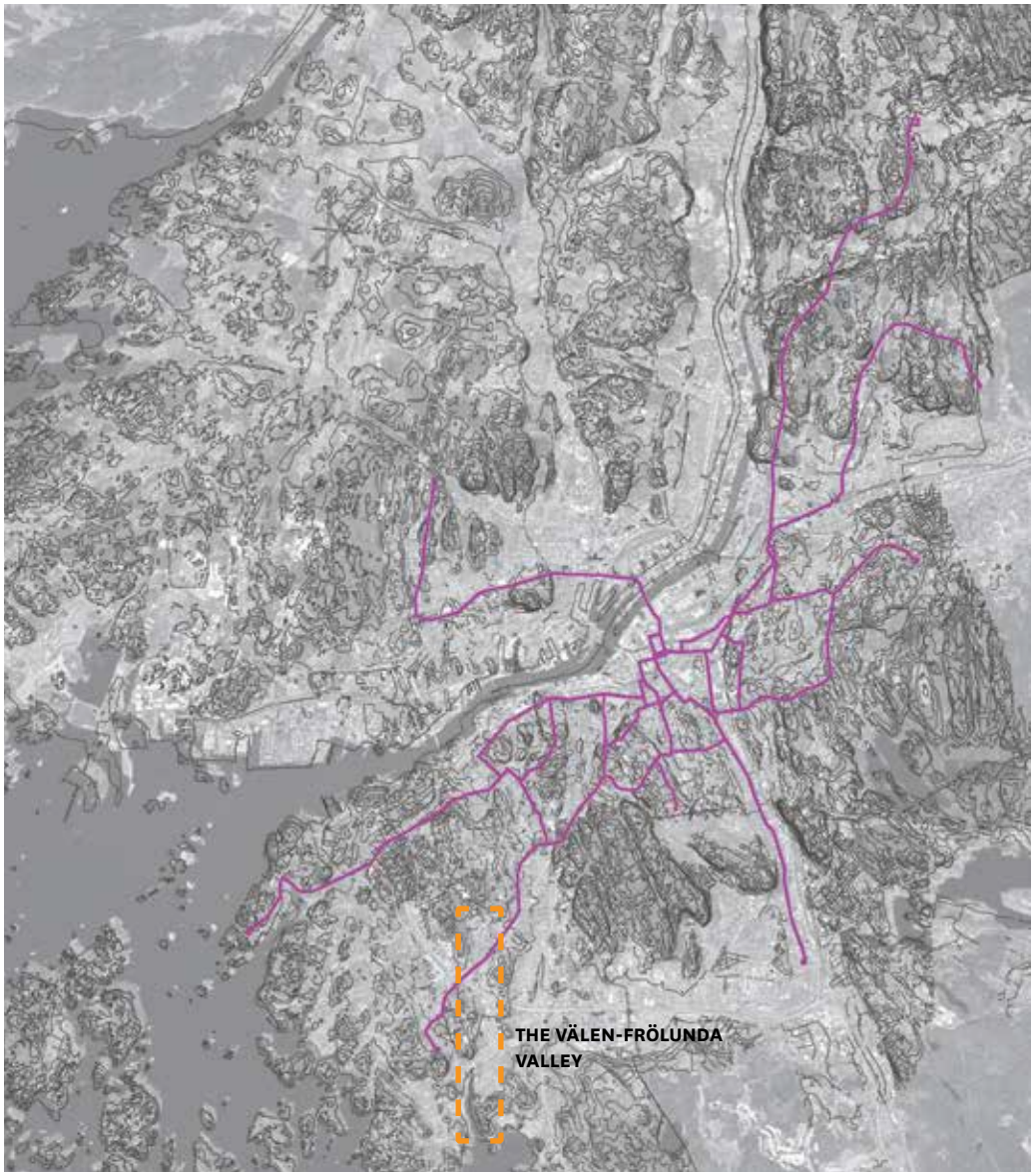
1950 Näset, the valley before urban exploitation. The roads and the crossings where an intricate network of potential meeting places.

Photo: Västra Frölunda Hembydsförening (1988) Bilder från Västra Frölunda

1960 Frölunda centre. The tram was finished 1964. The trams and the new suburbs came together as a new way of living and travelling., between the home in the suburb and the work in other parts of the city.

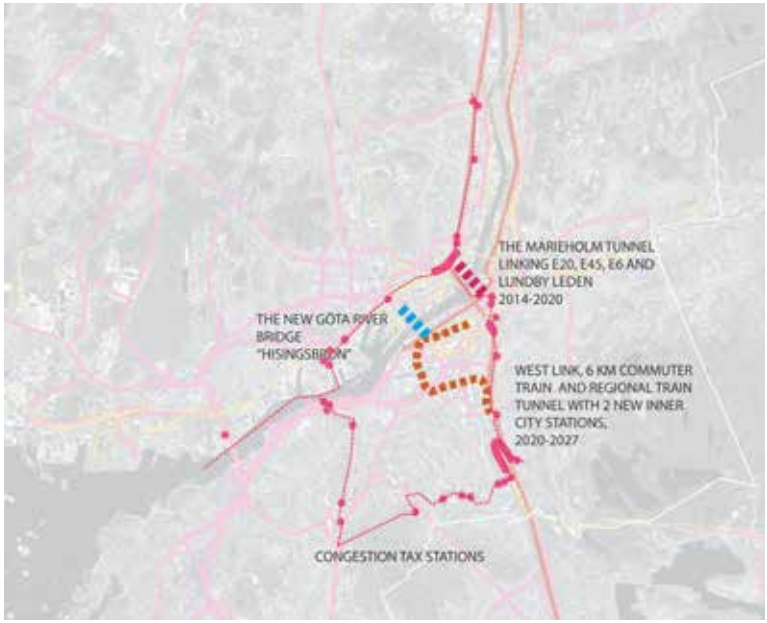
Photo: Västra Frölunda Hembydsförening (1988) Bilder från Västra Frölunda

The tram line system in Gothenburg, only minor changes has been done between 1970-2013



Layer 1: Gothenburg,based on Orthophoto at Hitta.se (2013) Göteborg (online) available at: http:// www.hitta.se
Layer 2: Topography , Översiktplan, ÖP (2009) Göteborgs Översiktsplan 2009. Gothenburg: Gothenburg municipality
Layer 3: Tramline, based on maps from Västrtrafik (2013) Linjer. Gäteborg: Västtrafik (online), available at http://www.vasttrafik.se/#!/reseinformation/linjer/[2013-08-15]

The new Göta River Bridge will have tram line tracks. The bridge in planned to be finished 2020. These changes are all outside of the working area.



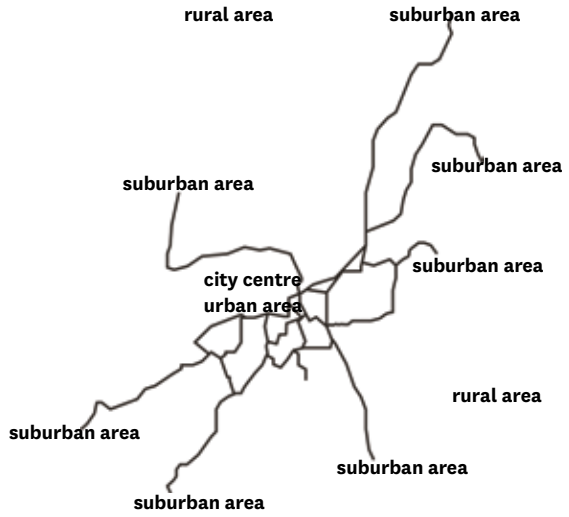
Layer 1: Gothenburg,based on Orthophoto at Hitta.se (2013) Göteborg (online) available at: http:// www.hitta.se
Layer 2: main roads , Översiktplan, ÖP (2009) Göteborgs Översiktsplan 2009. Gothenburg: Gothenburg municipality
Layer 3: Västsvenska pakete based on Trafikverket (2013)Västsvenska paketet, Trafikverket (online) availabel at: http://www.trafikverket.se/Privat/I-ditt-lan/Vastra-gotaland/Vastsvenska-paketet/ [2013-07-07]

The trams where introduced and where expanded simultaneously with the suburbs. Busses complement the tram system and connect across the tram lines. Within the nearest future no development of the tram system is planned.

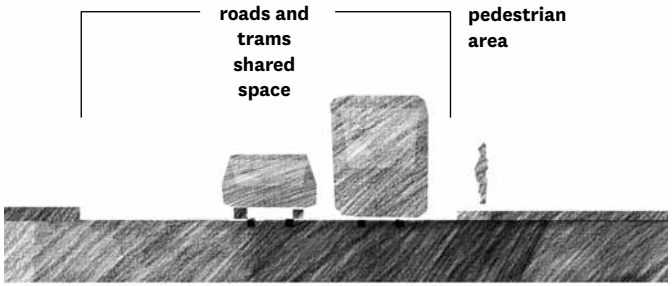
TODAY SUBURBAN AREAS IN GOTHENBURG ARE DESIFIED, IS IT THEN POSSIBLE TO ENHANCE THE TRAM LINE AREA AS A PUBLIC SPACE?

THE RURAL-SUBURBAN-URBAN-SUBURBAN-RURAL CONNECTION THAT THE TRAMLINE ALSO EMBODY, HOW COULD THESE EXISTING LINKS BE DEVELOPED?

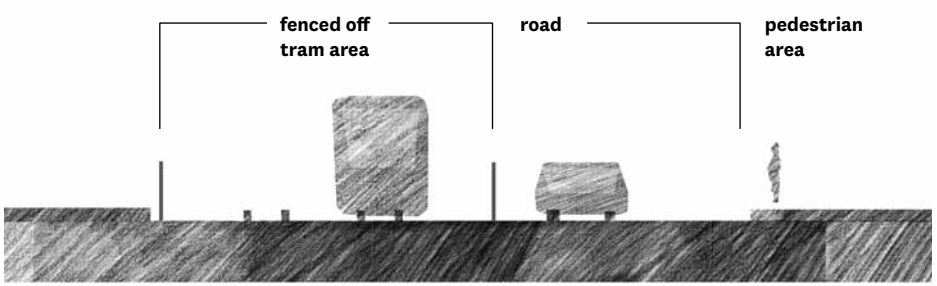
TRAM LINE AS A CONTINUOUS NETWORK



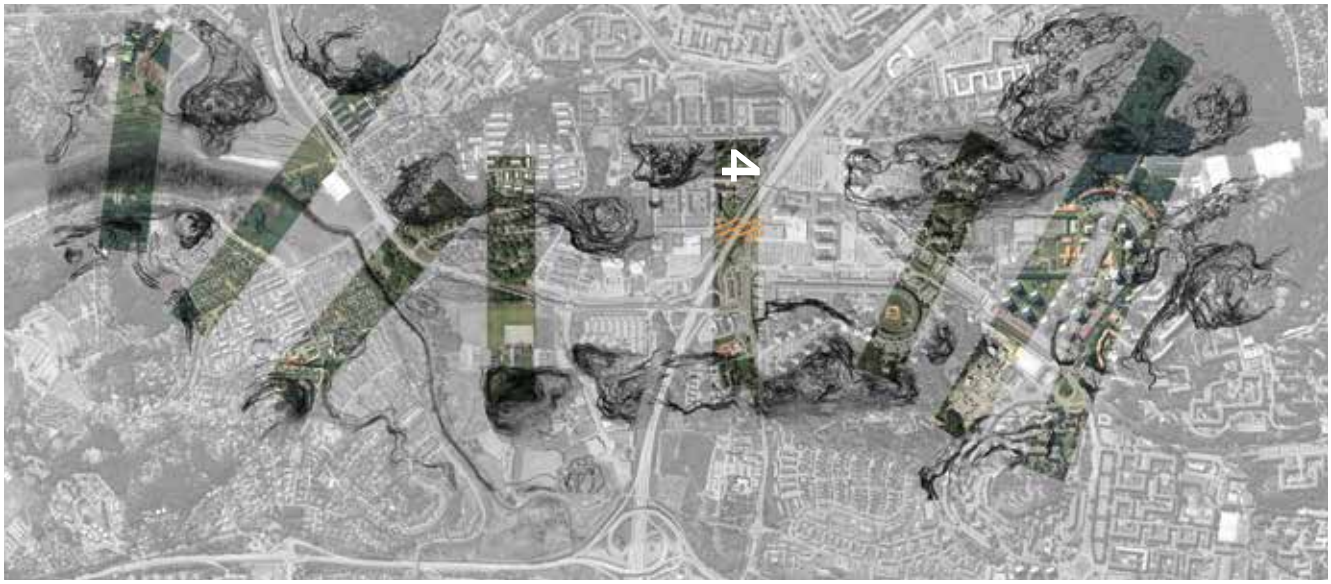
TRAM LINE AS PUBLIC SPACE IN THE CITY CENTRE



TRAM LINE IN FRÖLUNDA



Layer 1: Ortophoto Välen -Frölunda (2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 2: authors drawing



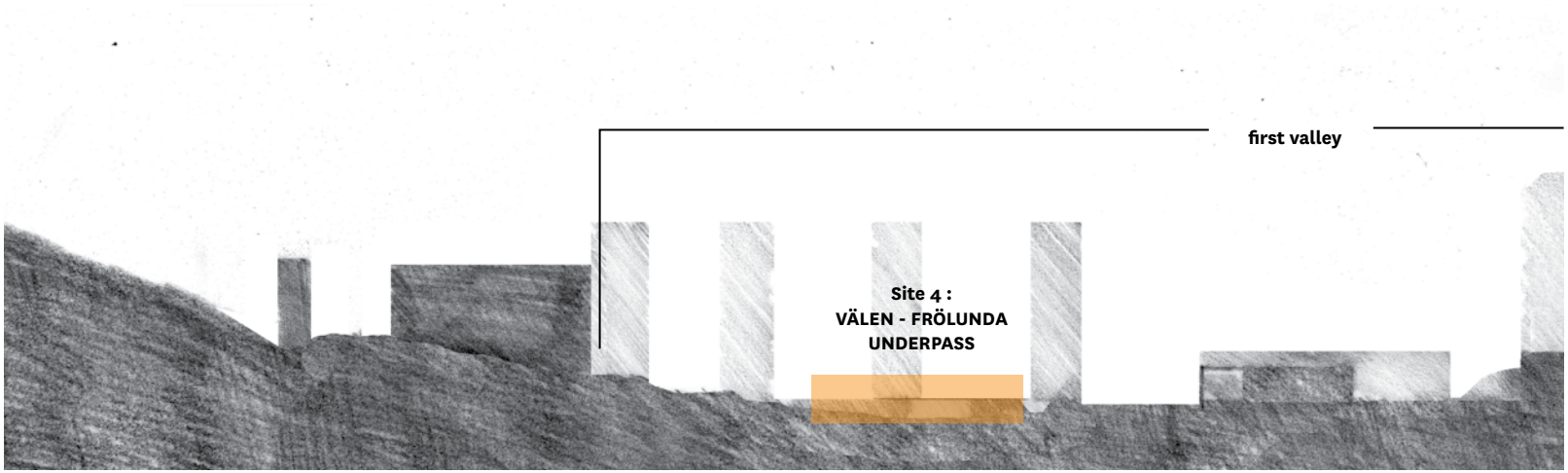
SITE 4 VÄLEN-FRÖLUNDA UNDERPASS

Layer 1: Orthophoto (2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 2: Topography, Gothenburg primary map.(2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 3: Section-window and site (authors drawing)

SECTIONS & PLAN

TEMPORALITY / FUNCTIONALITY

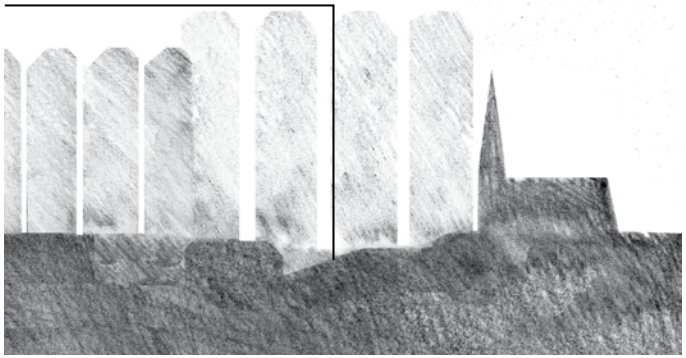
SPATIALITY



PLAN

Frölunda Church
Built 1866

Pruned Sorbus
intermedia



Layer 1: Orthophoto (2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 2: Topography, Gothenburg primary map,(2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 3: Section-window and site (authors drawing)

Layer 1: orthophoto Chalmers University Collage of Architecture gothenburg. Map archive, spring 2013
Layer 2: excerpts from primary map, gothenburg municipality, from chalmers university university collage of architecture gothenburg.
Layer 3: distances (authors drawing)

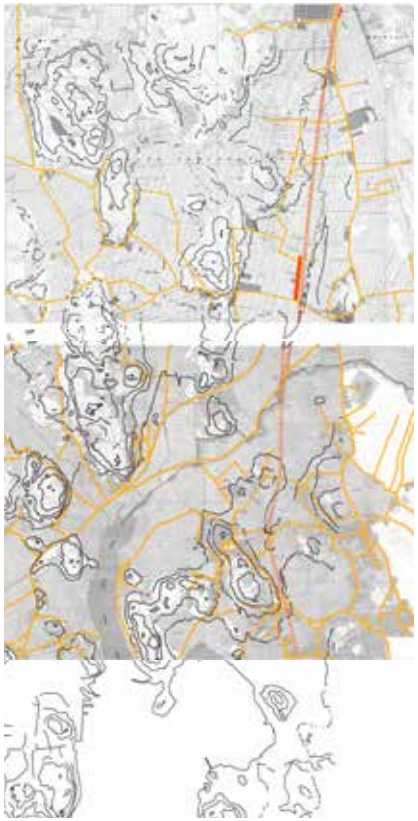
The underpass, connecting the valley, Frölunda with Välen, have a formal cycleway and walkway, but also trampled footpaths.

Short sight lines and badly light up makes passing through the underpass an uncomfortable experience.

The underpass is difficult to see from the road as it is narrow and steep.

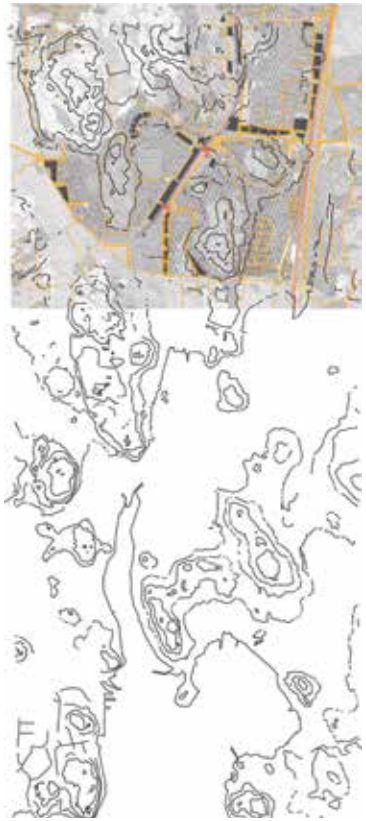
ISSUE LOCAL AND REGIONAL TRAFFIC

Roads 1923 (the upper map) and 1956 (the lower map). The roads connected farms to farms, and where placed in the farmland borders and according to land-ownership.



layer 1: Topography , Översiktplan, ÖP (2009) Göteborgs Översiktsplan 2009. Gothenburg: Gothenburg municipality
Layer 2: Frölunda socken 1923 & 56, Arkivet för bygg, plan och lantmäteri (2013) Frölunda socken 1923 &1956. Gothenburg: Gothenburg municipality
Layer 3: Enhancement of roads, authors drawing

Roads 1963. The exploitation of the valley has started, and roads where placed in the centre of the valley, connecting the houses to the main roads.



layer 1: Topography , Översiktplan, ÖP (2009) Göteborgs Översiktsplan 2009. Gothenburg: Gothenburg municipality
Layer 2: Frölunda socken 1963, Arkivet för bygg, plan och lantmäteri (2013) Frölunda socken 1963. Gothenburg: Gothenburg municipality
Layer 3: Enhancement of roads, authors drawing

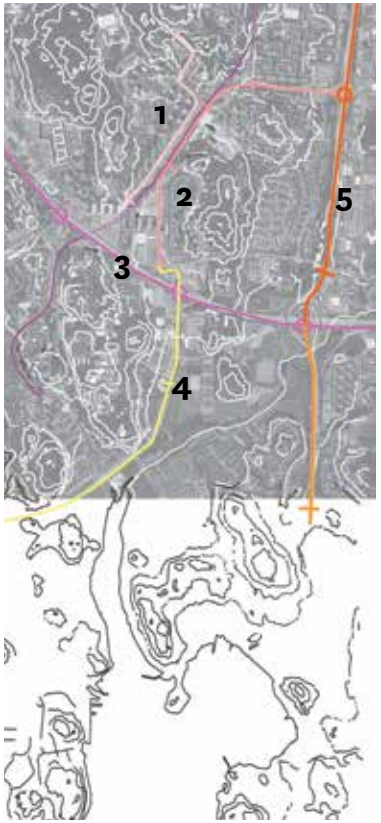
Roads 1979. As the modernist suburbs where built for car commuting, the local roads where heavy trafficked.

Number of cars / day 1975

1. 4 100
2. 15 200
3. 13 700
4. 13 900
5. 35 500

layer 1: Topography , Översiktplan, ÖP (2009) Göteborgs Översiktsplan 2009. Gothenburg: Gothenburg municipality
Layer 2: Frölunda socken 1923, Arkivet för bygg, plan och lantmäteri (2013) Frölunda socken 1923. Gothenburg: Gothenburg municipality
Layer 3: Enhancement of roads, authors drawing
Layer 4. Statistics, Gothenburg city (online) http://www4.goteborg.se/prod/G-info/statistik.nsf

Roads 2013. The regional traffic has increased since 1979, as the local traffic is steered to use the main roads.

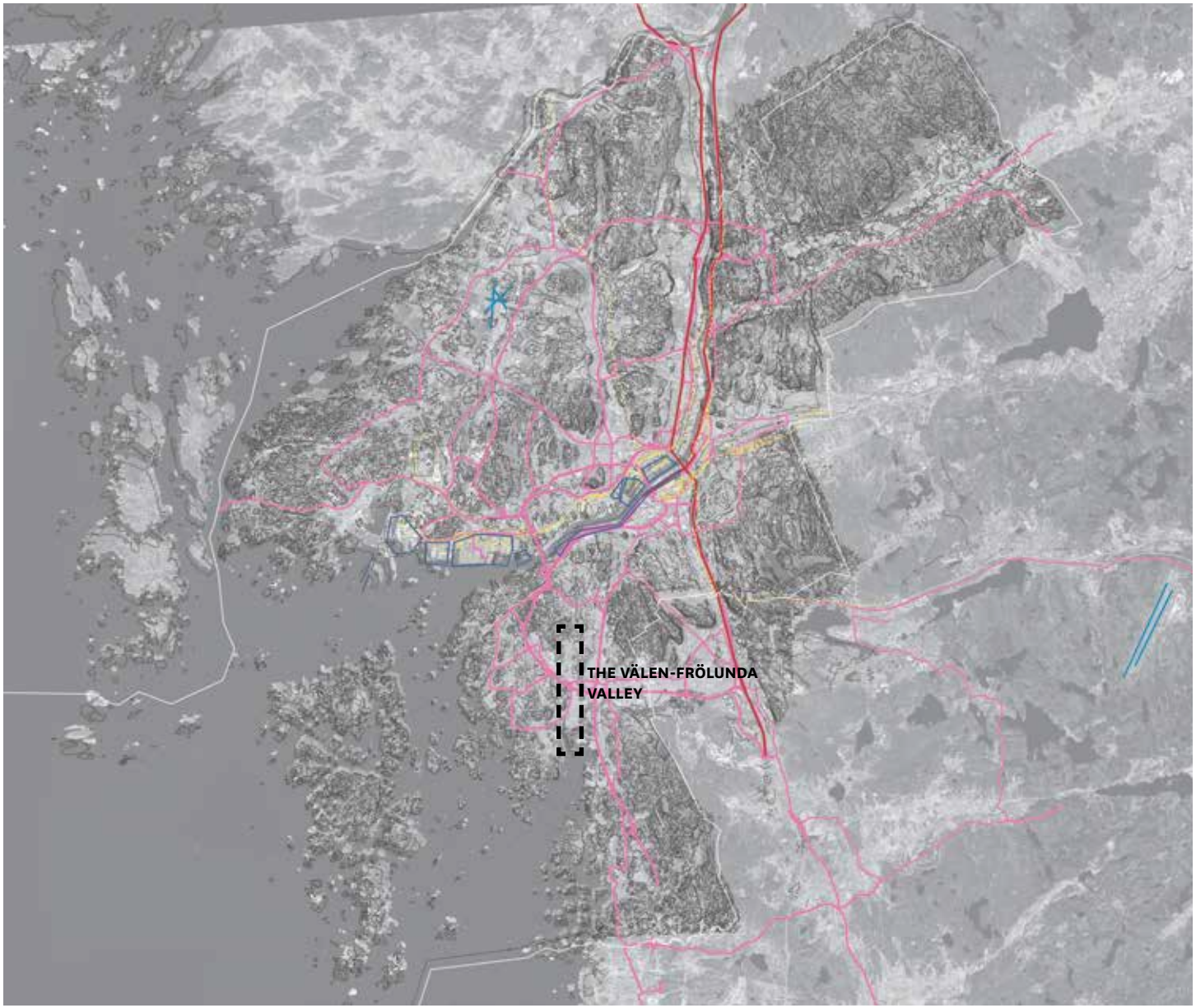


Number of cars / day 2012

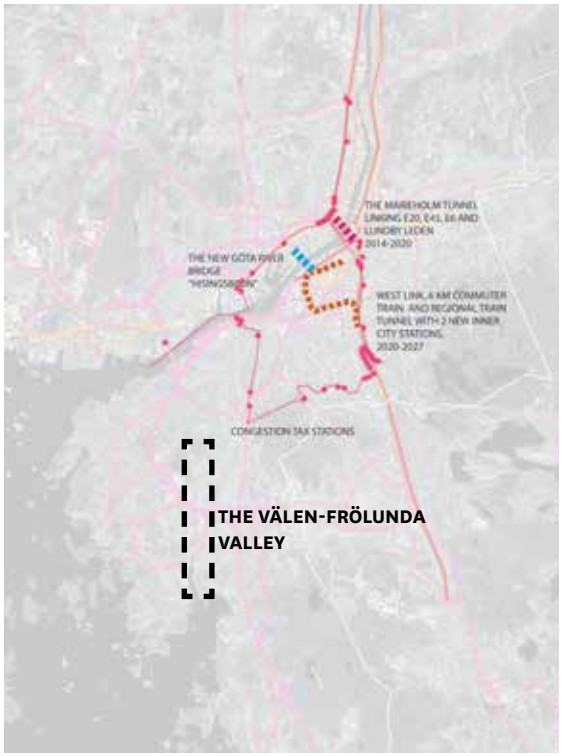
1. 4 100
2. 6 600
3. 52 800
4. 16 700
5. 28 800

Layer 1: Topography , Översiktplan, ÖP (2009) Göteborgs Översiktsplan 2009. Gothenburg: Gothenburg municipality
Layer 2: Orthophoto (2013) Map archive, Chalmers University of Technology, Dep. of Architecture Gothenburg.
Layer 3. enhanced road structures based Översiktplan, ÖP (2009) Göteborgs Översiktsplan 2009. Gothenburg: Gothenburg municipality, authors drawing,
Layer 4. Statistics, Gothenburg city (online) http://www4.goteborg.se/prod/G-info/statistik.nsf

2013 . The maps shows the current network of main roads, rail roads, harbours and airports. One of the big regional roads is cutting through the The Välen-Frölunda valley.

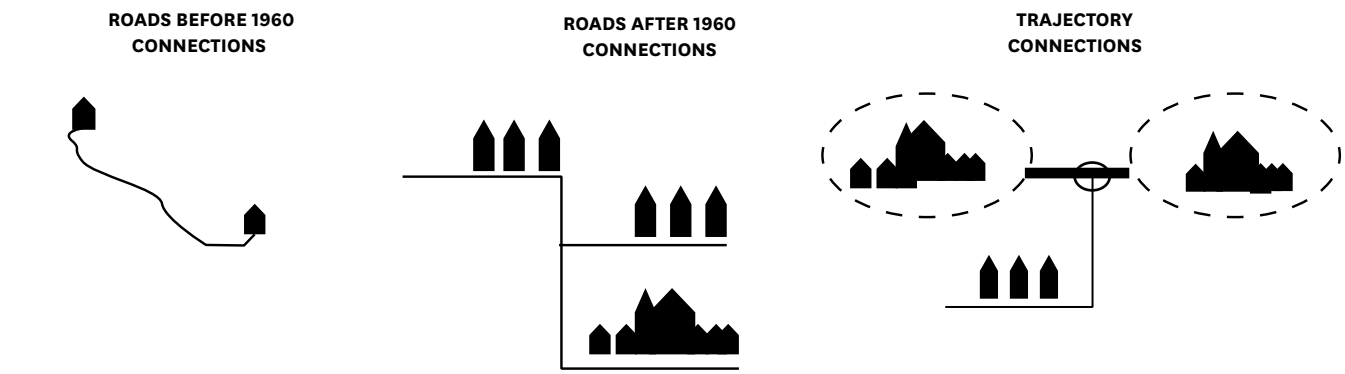


The West Swedish agreement / Västsvenska paketet are changing the traffic situation in the Gothenburg inner city area, how this will affect the working area is hard to predict.



Layer 1: Gothenburg,based on Orthophoto at Hitta.se (2013) Göteborg (online) available at: http:// www.hitta.se
Layer 2: Enhanced main roads, airports , harbours and railroads, based on Översiktplan, ÖP (2009) Göteborgs Översiktsplan 2009. Gothenburg: Gothenburg municipality
Layer 3: Västsvenska paketet based on Trafikverket (2013)Västsvenska paketet, Trafikverket (online) available at: http://www.trafikverket.se/Privat/I-ditt-lan/Vastra-gotaland/Vastsvenska-paketet/ [2013-07-07]

Layer 1: Gothenburg,based on Orthophoto at Hitta.se (2013) Göteborg (online) available at: http:// www.hitta.se
Layer 2: Topography, Översiktplan, ÖP (2009) Göteborgs Översiktsplan 2009. Gothenburg: Gothenburg municipality
Layer 3: Enhanced main roads, airports , harbours and railroads, based on Översiktplan, ÖP (2009) Göteborgs Översiktsplan 2009. Gothenburg: Gothenburg municipality



Before 1960 roads followed the landscape settings and the farming culture's land use, connecting houses to houses

After 1960 roads and housing followed the landscape settings due to economics and efficiency and where connecting suburbs to suburbs and suburbs to the city.

The West Swedish Agreement is improving the capacity of the road-system by bridges and tunnels. Simultaneously the inner city is surrounded by congestion charge stations. Consequences for the suburbs are increased traffic on the regional highways passing by or through the suburbs.

The road system in Gothenburg is under continuos development, both on a local scale, like introducing bikeways or new roundabouts, on the city scale and regionally.

As Gothenburg has the most important harbour in Scandinavia, the road system is mainly strengthened in order to make the connection from the bigger region- being Scandinavia as a whole- and the harbour area. A new train tunnel for commuter trains is to be constructed. To not make the inner city suffer from the increased road capacity, the city centre is surrounded with congestion charge stations. These actions are all part of the West Agreement- infrastructure development investment.

The suburbs like Frölunda are affected by the regional roads, as big roads have large buffer zones and big roundabouts along them, making the traffic zone take up a large area in the middle of the valley. The roads that are not within the congestions charge area, such as Västerleden cutting through the Välen-Frölunda valley, may in the future have increased traffic as the traffic is steered to those roads.

HOW IS IT POSSIBLE TO ESTABLISH NEW CONNECTIONS ON A LOCAL SCALE TO PROMOTE ALL TYPES OF TRAFFIC?

Layer 1: Ortophoto Välen -Frölunda (2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 2: authors drawing

SITE 5 VÄLEN FOOTBALL FIELD

Layer 1: Orthophoto (2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 2: Topography, Gothenburg primary map,(2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 3: Section-window and site (authors drawing)

SECTIONS & PLAN

TEMPORALITY / FUNCTIONALITY

SPATIALITY

PLAN

Biotope: Pine forest on bare rock

Settlement from 1800-500 BC

Row houses Korsåsgatan built in the 1970s

Korsåsgatan
Biotope: Primary light demanding trees and bushes; Salix ssp, Betula ssp, Populus tremula

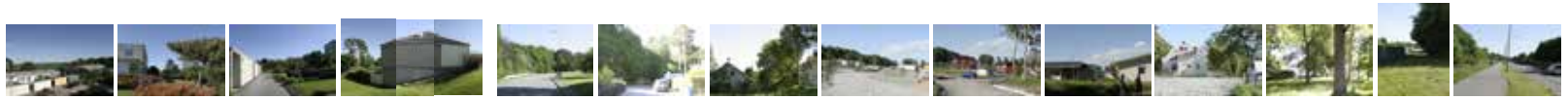
Villas from different decades

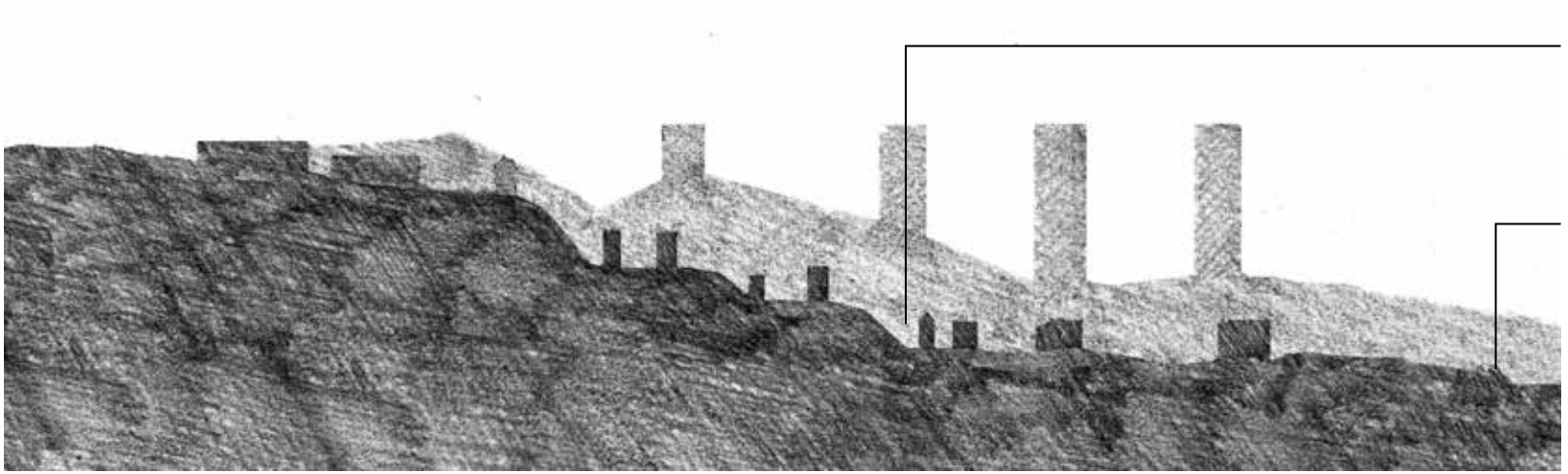
Row houses from 2012 and under construction

“Ängås gård” main building from 1750th and finding of settlement from 1800-500 BC

Tilia ssp. alley, to “Ängås gård”

Cycle way along Näsetvägen constructed 2012





Landfill with light demanding brushy vegetation and ruderal vegetation

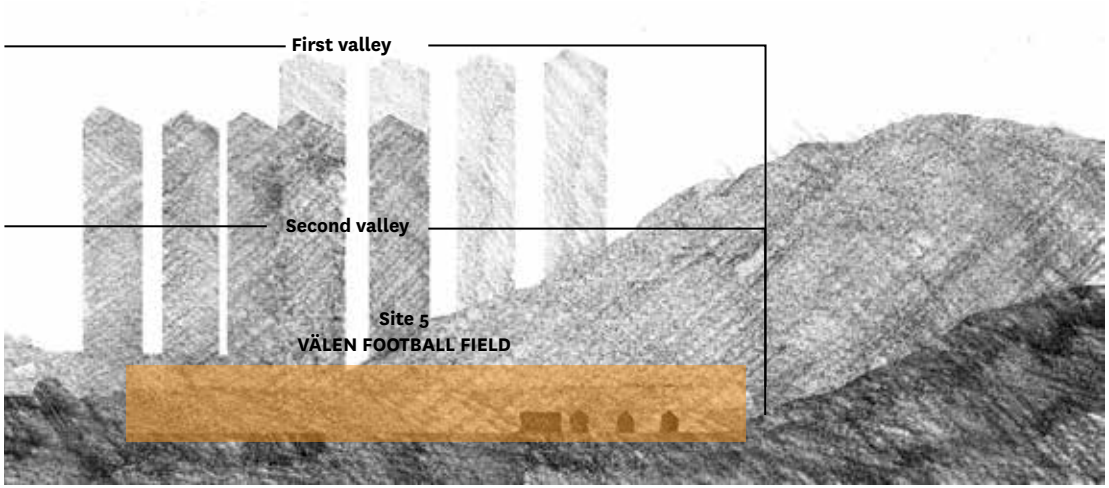
Football field “Välen 1-6”

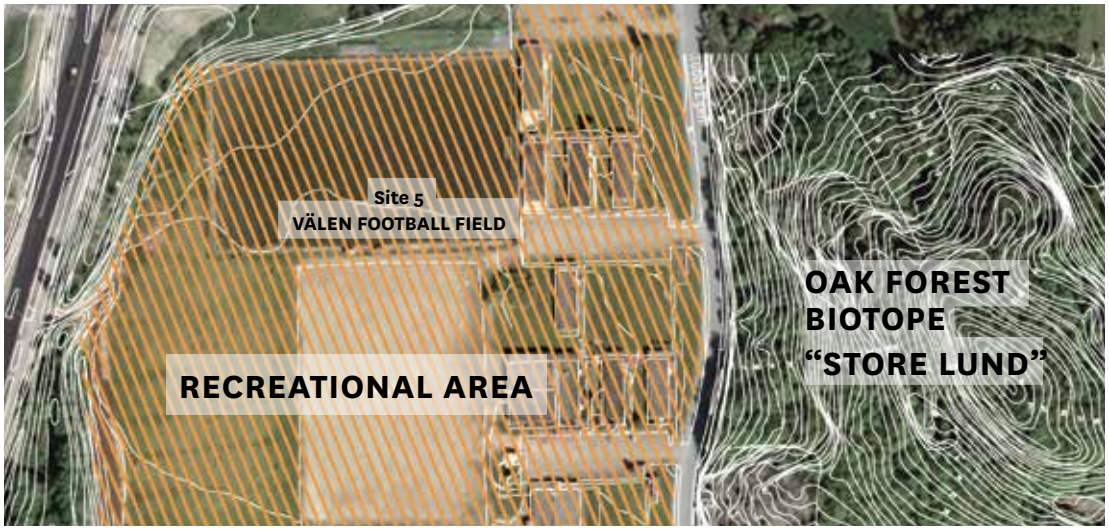
Välen clubvillage

Informal settlement

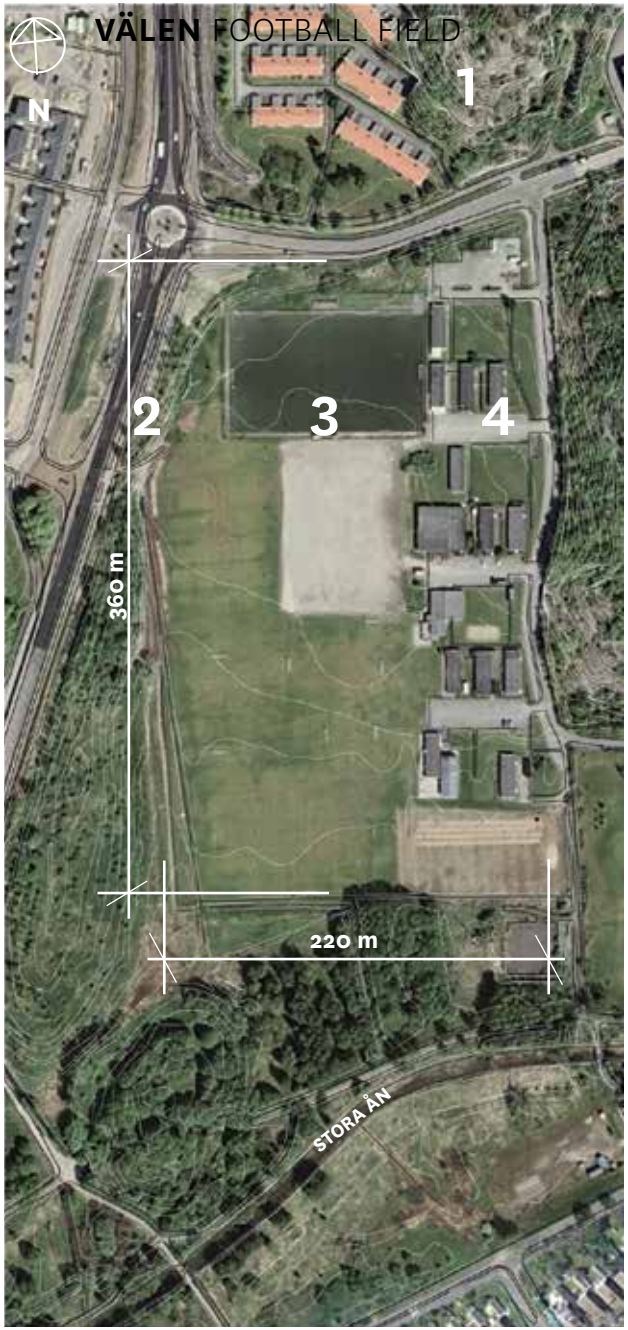
In Store Lund: stone circle from Stone age-Bronze age 500 BC- 1050

“Store lund” Biotope: Pine forest on bare rock. Tree layer: Pinus sylvestris, Querques petraea. Shrub layer: Juniperus communis. Field layer: Vaccinium myrtillus, Lonicera periclymenum, Convallaria majalis





Layer 1: Orthophoto (2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 2: Topography, Gothenburg primary map,(2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.Layer 3: Section-window and site (authors drawing)



Layer 1: Orthophoto (2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 2: Excerpts from Topography, Gothenburg primary map,(2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 3: Distances, authors drawing

Välen club-village and Football field

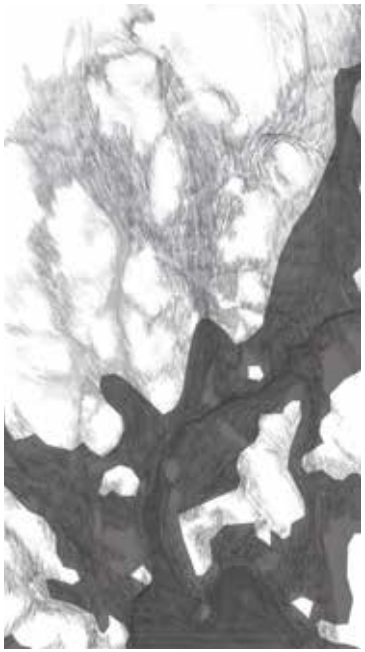
To the west the field is shield of from Näsetvägen by a landfill, inhabited by ruderal species and a Salix shrubbery.

The football fields are both of turf, artificial turf and gravel.

Välen club-village: Västra Frölunda IF, Assyriska BK, IF Väster, Göteborgs Rugbyförening, Frölunda judoklubb, Frölunda boxningsklubb (about 700 children and 7-26)

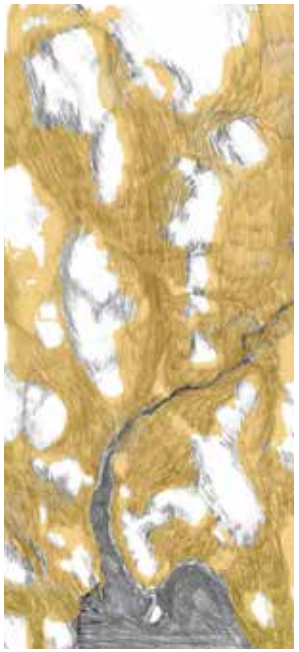
ISSUE URBAN VEGETATION

8000 years ago
Water levels have been fluctuating due to ice melting and elevation of the land



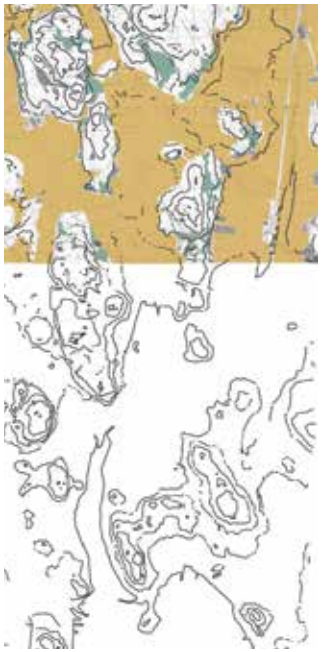
Layer 1: Topographic interpretation, authors drawing
Layer 2: interpretation of map of the coastline during the stone age in Västra Frölunda, sea level +15 m (1980)Bilder från Västra Frölunda. Göteborg: Västra Frölunda Hembygdsförening

1884. Farmland filled the valley. The hills was bare due to heavy grazing



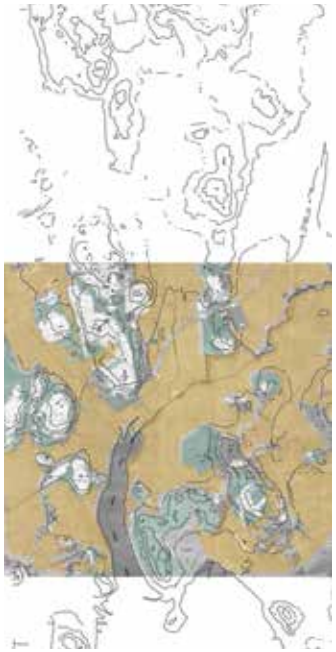
Layer 1: Topographic interpretation, authors drawing
Layer 2: interpretation of written description of Frölunda from 1884, Faktarum in Gothenburg City museum.

1923. Farmland filled the valley. The hills was partly grown with small trees, as they were grazed.



Layer 1: Topography , Översiktplan, ÖP (2009) Göteborgs Översiktsplan 2009. Gothenburg: Gothenburg municipality
Layer 2: Frölunda socken 1923. Arkivet för bygg, plan och lantmäteri (2013) Frölunda socken 1923. Gothenburg: Gothenburg municipality
Layer 3: Enhancement of land use, authors drawing

1956 Farmland filled the valley. The hills was partly grown with small trees, as they were grazed.



Layer 1: Topography , Översiktplan, ÖP (2009) Göteborgs Översiktsplan 2009. Gothenburg: Gothenburg municipality
Layer 2: Frölunda socken 1963. Arkivet för bygg, plan och lantmäteri (2013) Frölunda socken 1963. Gothenburg: Gothenburg municipality
Layer 3: Enhancement of land use, authors

1979. The northern part is built with housing which makes the rocks areas of free succession. In the south valley the land use is mixed between farmland, allotment gardens recreational football fields and forested hills.

layer 1: Topography , Översiktplan, ÖP (2009) Göteborgs Översiktsplan 2009. Gothenburg: Gothenburg municipality
Layer 2: Frölunda socken 1979. Arkivet för bygg, plan och lantmäteri (2013) Frölunda socken 1979. Gothenburg: Gothenburg municipality
Layer 3: Enhancement of land use, authors drawing

1990. The hills is forested and the recreational values are enhanced by creating Ruddalen recreational Centre.
1994. Wetlands and wet pastures along Välen bay and enhanced sports areas are created.

Layer 1: Topography , Översiktplan, ÖP (2009) Göteborgs Översiktsplan 2009. Gothenburg: Gothenburg municipality
Layer 2: Västra Frölunda 1990 &94. Arkivet för bygg, plan och lantmäteri (2013) Västra Frölunda 1990 & 1994. Gothenburg: Gothenburg municipality
Layer 3: Enhancement of land use, authors drawing

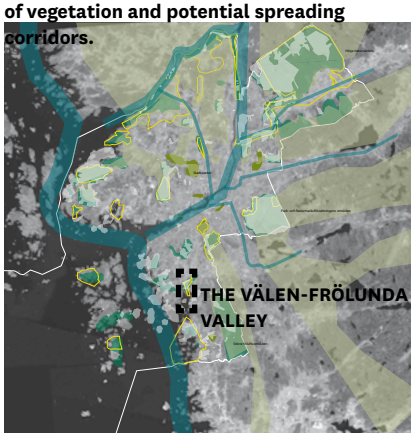
In the 1950th when Frölunda Centre was built the new urban style of building and living stood in big contrast to the current farming culture.

Photo: Västra Frölunda Hembygdsförening (1980)
Bilder från Västra Frölunda . Göteborg: Västra Frölunda Hembygdsförening

2013. Valuable city parks and larger nature and recreational areas for Gothenburg municipality.

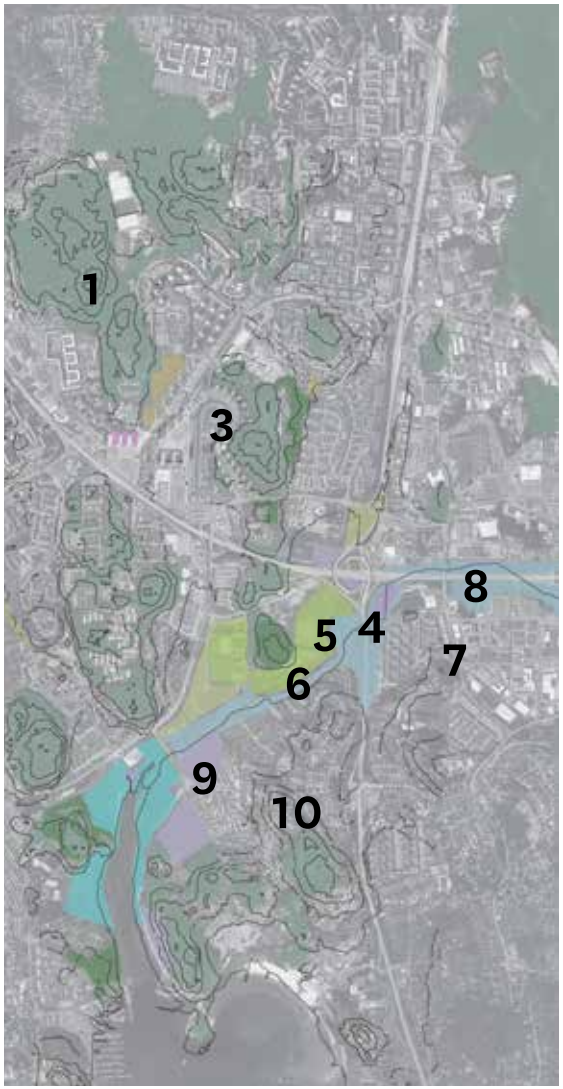
Layer 1: Orthophoto at Hitta.se (2013) Göteborg (online) available at: http:// www.hitta.se
Layer 2: Topography , Översiktplan, ÖP (2009) Göteborgs Översiktsplan 2009. Gothenburg: Gothenburg municipality
Layer 3: Valuable green structures. "Liten Grönplan" , Götebors stad (2013) Standsutveckling 2035. Gothenburg municiplaity(online) available at: http://goteborg.se/wps/portal/enheter/projekt/stadsutveckling-2035/ [2013-08-15]

Regional strategy plan for preserving green and blue wedges, a contiunuety of vegetation and potential spreading corridors.



Layer 1: Orthophoto at Hitta.se (2013) Göteborg (online) available at: http:// www.hitta.se
Layer 2: Topography , Översiktplan, ÖP (2009) Göteborgs Översiktsplan 2009. Gothenburg: Gothenburg municipality
Layer 3: Valuable green structures. "Liten Grönplan" , Göteborgs stad (2013) Standsutveckling 2035. Gothenburg municipality(online) available at: http://goteborg.se/wps/portal/enheter/projekt/stadsutveckling-2035/ [2013-08-15]

2013. Vegetation types today. In the northern part of the valley the most common biotope (depart from grass lawns and solitary trees) are multilayered forested hilltops. In the south the biotopes have a big variation and are also important bird and fish habitats.



Layer 1:Orthophoto (2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 2:Topography , Översiktplan, ÖP (2009) Göteborgs Översiktsplan 2009. Gothenburg: Gothenburg municipality
Layer 3: interpretation of Översiktsplan 2009 map "Land- and water use" Översiktplan, ÖP (2009) Göteborgs Översiktsplan 2009. Gothenburg: Gothenburg municipality

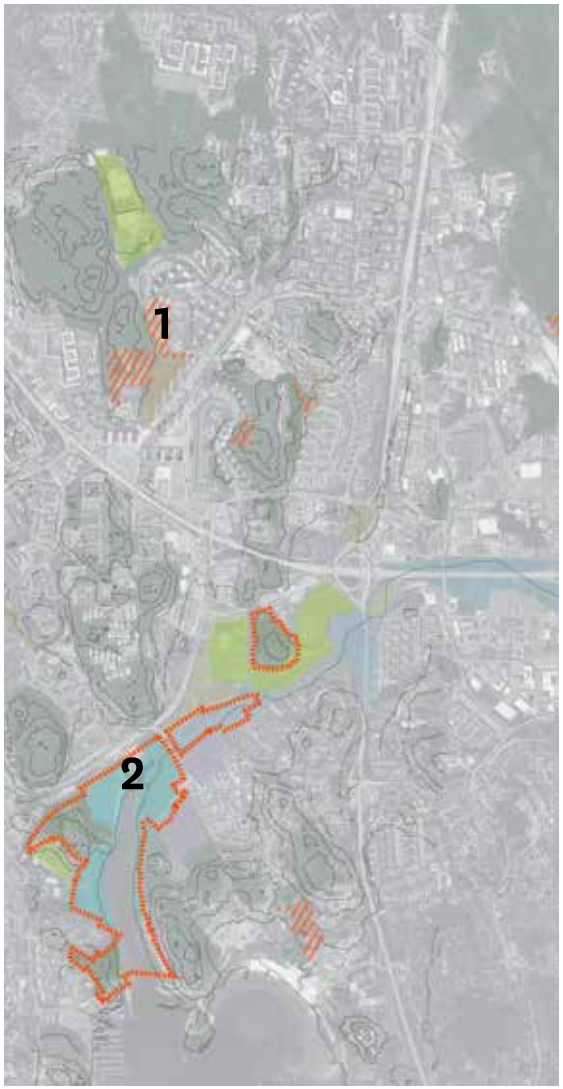
VEGETATION TYPES

1. **Pine forest on bare rock**
2. **Park**
3. **Garden style planting**
4. **Oak forest on bare rock**
5. **Recreational area, football fields, golf course etc.**
6. **Ruderal Salix shrubbery**
7. **Creak and floodable weed and grassland**
8. **Grey water retention pond**
9. **Floodable graze land and meadow**
10. **Allotment gardens**

FUTURE CHANGES IN VEGETATION TYPES/ LAND USE

1. **Exploitation by housing**
2. **Välen nature reserve**

Future changes in vegetation types/ land use . Both In the north and the south some of the hilltops are exploited by housing. Along the bay on the contrary the nature areas are becoming reserves.

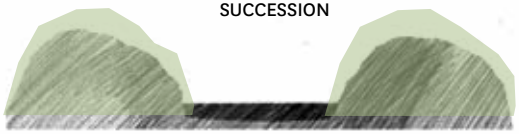


Layer 1:Orthophoto (2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 2:Topography , Översiktplan, ÖP (2009) Göteborgs Översiktsplan 2009. Gothenburg: Gothenburg municipality
Layer 3: interpretation of Översiktsplan 2009 map "Land- and water use" Översiktplan, ÖP (2009) Göteborgs Översiktsplan 2009. Gothenburg: Gothenburg municipality
Layer 4: Välen nature reserve and planning projects based on on-going plans according to Gothenburg municipality (2013) Aktuella plan- och byggprojekt. (Online) available at: http://goteborg.se/wps/portal/invanare/bygga-o-bo/kommunens-planarbete/plan--och-byggprojekt/[2013-01-30 - 2013-07-30]

FARMING COMMUNITY:
BIODIVERSITY IN THE VALLEY
DUE TO SMALL SCALE FARMING

In the pre- industrialized small scale farming cattle-breeding, cultivation of meadows, resting land due to crop rotation made the framed valley the most species rich and diverse.

AFTER 1960 -
BIODIVERSITY ON THE ROCKY
HILLS DUE TO CHANGE
IN LAND USE, THUS FREE
SUCCESSION



When the valley was built after 1960 and onwards, grazing stopped on the hills and they where forested. The poor soils prerequisite high biodiversity.

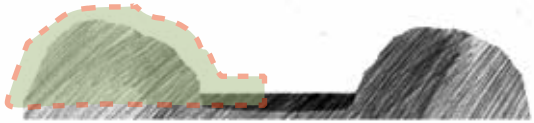
TRAJECTORY:
BIODIVERSITY LOSS DUE TO
BUILDING ON THE HILLS

The city are planing to densify the area. Buildings on any site decreases the biodiversity and the possibilities for dispersal.

AFTER 1960 -
BIODIVERSITY DUE TO
POLLUTED SOIL

Areas with polluted soils and landfills have been left for free succession and have turned into bird habitats

TRAJECTORY:
PRESERVING BIODIVERSITY BY
MAKING NATURE RESERVES



Species rich areas along the bay are restricted by the Nature reserve protection and the beach protection

TRAJECTORY:
CLIMATE CHANGE

?

The vegetation in the Välen-Frölunda valley has gone through great changes during the last century, from being a small scale farming landscape with pastures, meadows, and fields, rich in biodiversity, the modern housing movement displaced the vegetation to develop on the previously grazed hillsides. The main trajectory has so forth been the movement from a continuous farming landscape to fragmented patches of forest and solitary trees in rows and parks. Today areas with vegetation are constantly adjusting to the housing development. A second issue has though changed the vegetation: polluted soils and landfills. On polluted sites it is prohibited to build therefore shrubberies, habitats for birds and insects, has freely evolved on these sites.

A third not yet mentioned issue is climate change. In the area the forecast is, higher sea levels, increased precipitation and temperature rise.

HOW IS IT POSSIBLE TO PLAN FOR FUTURE URBAN VEGETATION AND TO PROMOTE BIODIVERSITY CONSIDERING CLIMATE CHANGE?

Layer 1: Ortophoto Välen -Frölunda (2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 2: authors drawing

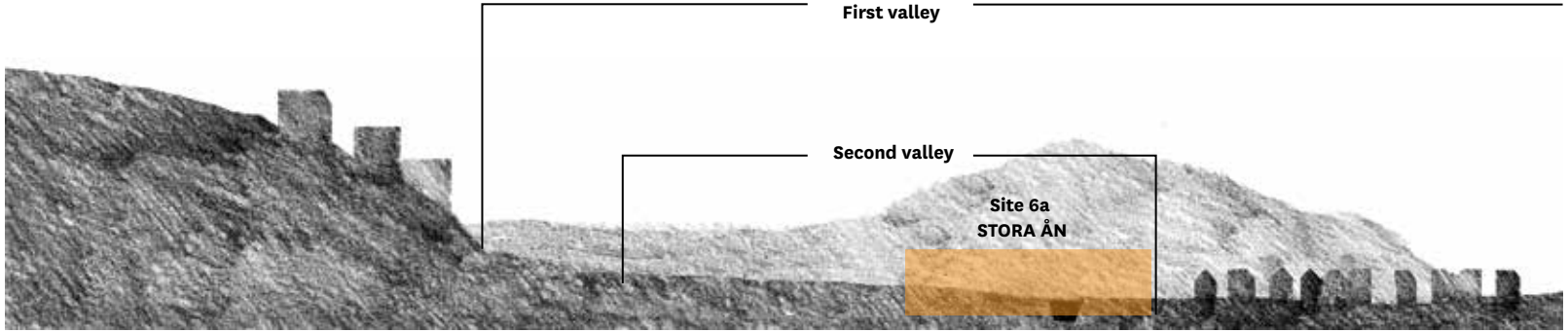
SITE 6a THE CREAK-STORA ÅN

Layer 1: Orthophoto (2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 2: Topography, Gothenburg primary map,(2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 3: Section-window and site

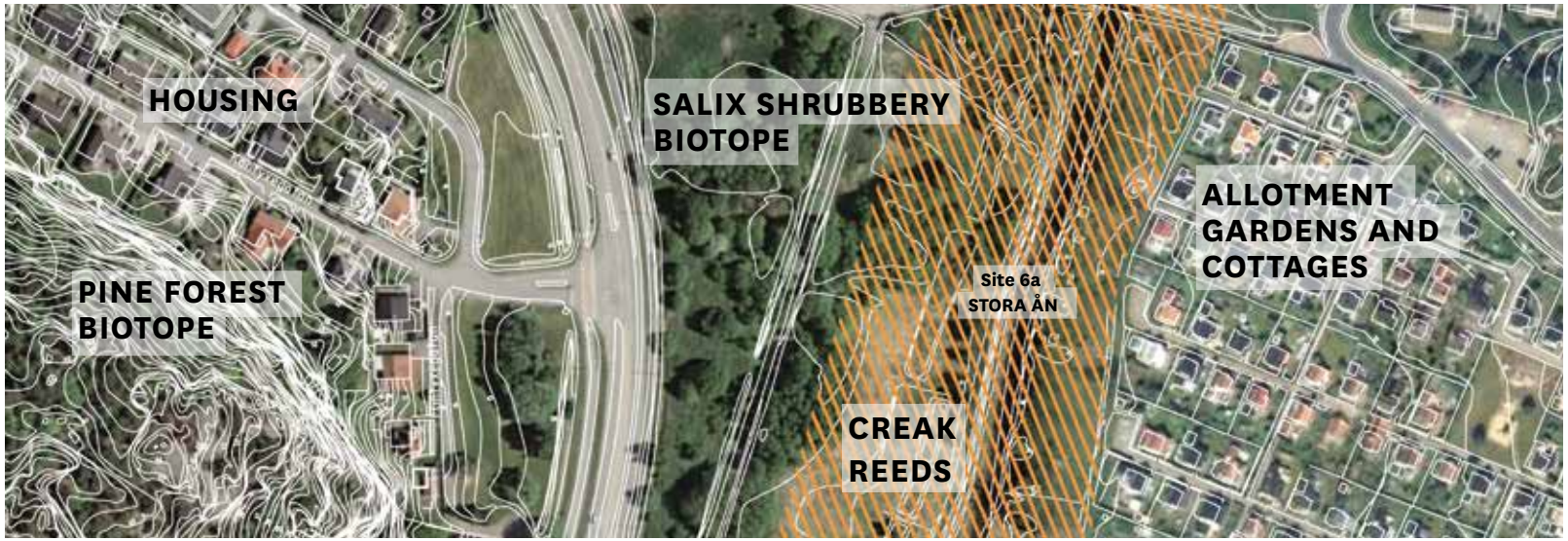
SECTIONS & PLAN

TEMPORALITY / FUNCTIONALITY

SPATIALITY



PLAN

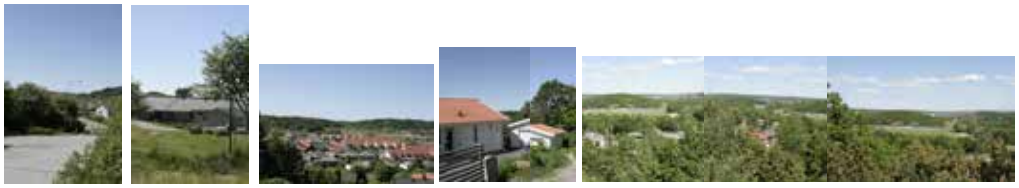


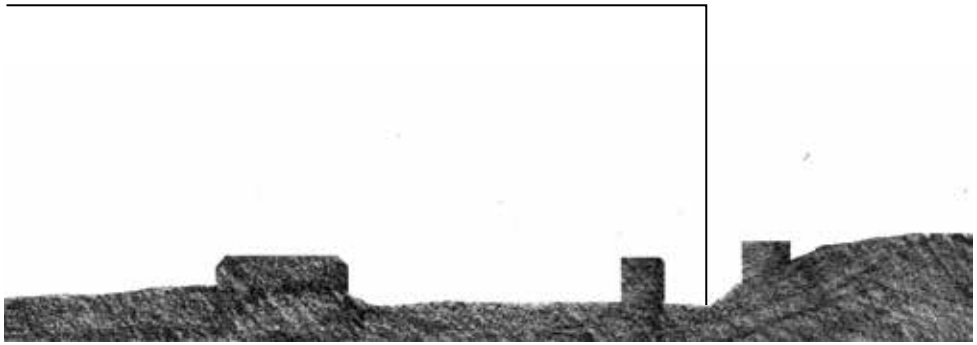
Rock carving -1800 BC

Kindergarten

Villas and row houses with gardens

Biotope: Pine forest on bare rock





Layer 1: Orthophoto (2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 2: Topography, Gothenburg primary map,(2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg
.Layer 3: Section-window and site

Stora Ån: This creak fragment of Stora Ån is1450 m long. The width is varying , on the picture the creak is approximately 10 m

Floodable area by the grey water retention pond

View towards “Store Lund”

The creak cleaned from reed in February

Ditches in the Salix shrubbery

The creak is eutrophicated thus the reeds filling the stream.

Walkway along a small stretch of the creak.

Layer 1: Orthophoto (2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 2: Excerpts from Topography, Gothenburg primary map,(2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 3: Distances, authors drawing

Layer 1: Ortophoto Välen -Frölunda (2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 2: authors drawing

SITE 6b THE BAY- VÄLENVIKEN

Layer 1: Orthophoto (2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 2: Topography, Gothenburg primary map,(2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 3: Section-window and site (authors drawing)

SECTIONS & PLAN

TEMPORALITY / FUNCTIONALITY

Biotope:
Pine forest on bare rock

Stonecircle
Bronze age - Stone age
1800-500 BC

Row houses
Bronsgjutargatan

Row houses
Bronsfyndsgatan

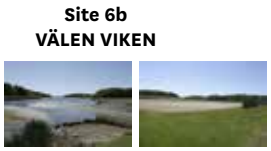
Näsetvägen

Åkereds gamla skolväg

Välen Nature area. Managed by Naturskyddsföreningen

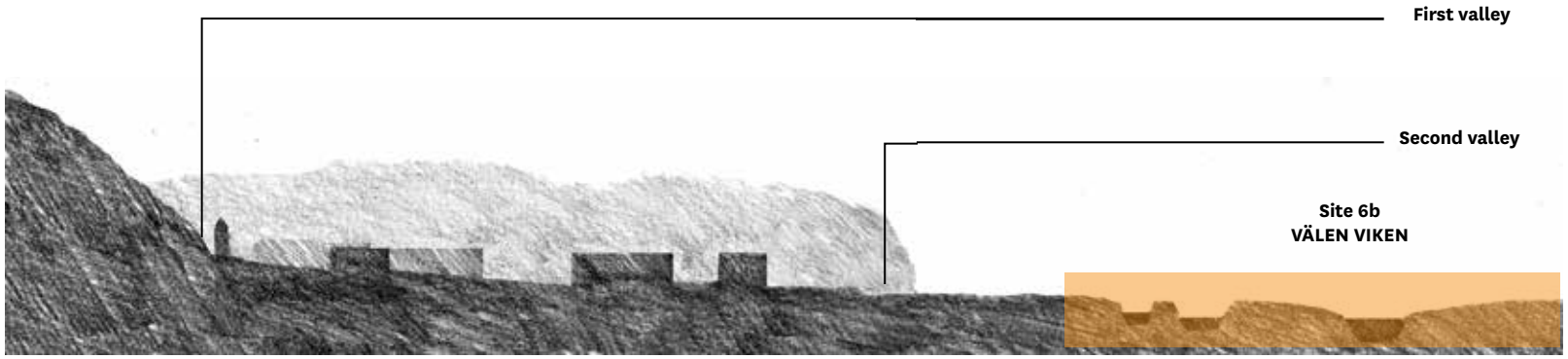
The bird-watch tower in Välen Nature area was burnt down in April 2013

Grey water retention ponds



Site 6b
VÄLEN VIKEN

SPATIALITY



PLAN

Floodable pasture

Parking lot to Välen allotment association Hagkroksvägen

Välen allotment association Built 1958

Forested rocky hill, edge species: Betula ssp. & Populus tremula

Biotope: Pine forest on bare rock. Tree layer: Pinus sylvestris Shrub layer: Juniperus communis Filed layer: Calluna vulgaris

Layer 1: Orthophoto (2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 2: Topography, Gothenburg primary map,(2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 3: Section-window and site (authors drawing)

Välen in February,
covered in reed

Stormwater ditch, leading the water from the housing area at Opaltorget to the retention pond

Tower for bird watch.

Retention pond-system

The shallow Välen bay

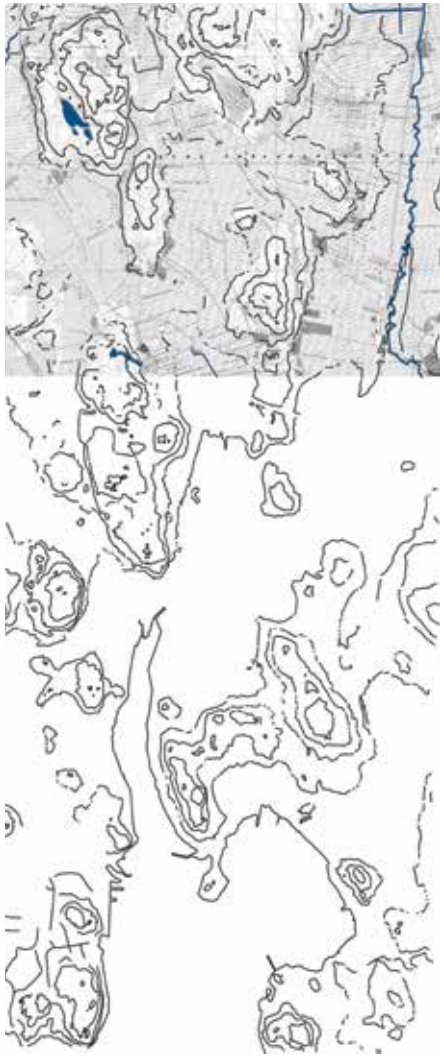
Greywater piped into the bay after the retention.

High-land cattle grazing
the floodable pastures

Layer 1: Orthophoto (2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 2: Excerpts from Topography, Gothenburg primary map,(2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 3: Distances, authors drawing

ISSUE SEA LEVEL RISE

1923 The creaksand lakes are following the topography.

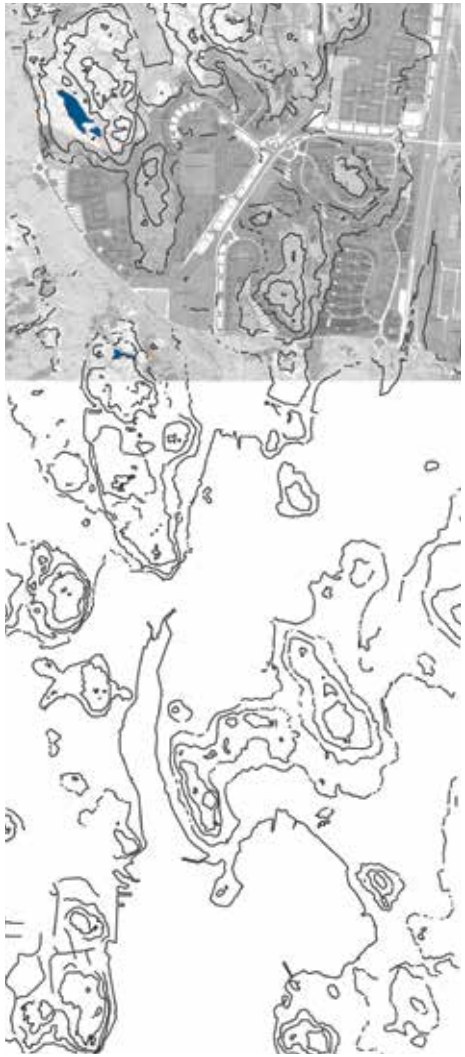


Layer 1: Topography , Översiktplan, ÖP (2009) Göteborgs Översiktsplan 2009. Gothenburg: Gothenburg municipality
Layer 2: Frölunda socken 1923. Arkivet för bygg, plan och lantmäteri (2013) Frölunda socken 1923. Gothenburg: Gothenburg municipality
Layer 3: Enhancement of water, authors drawing

1956 Many small creaks are following the topography, and slowly leading the water towards the recipient Välen bay.

Layer 1: Topography , Översiktplan, ÖP (2009) Göteborgs Översiktsplan 2009. Gothenburg: Gothenburg municipality
Layer 2: Frölunda socken 1956. Arkivet för bygg, plan och lantmäteri (2013) Frölunda socken 1956. Gothenburg: Gothenburg municipality
Layer 3: Enhancement of water, authors drawing

1963 The creaks are in culverts, but the small lakes on the hillstops remain.



Layer 1: Topography , Översiktplan, ÖP (2009) Göteborgs Översiktsplan 2009. Gothenburg: Gothenburg municipality
Layer 2: Frölunda socken 1963. Arkivet för bygg, plan och lantmäteri (2013) Frölunda socken 1963. Gothenburg: Gothenburg municipality
Layer 3: Enhancement of water, authors drawing

1979 The creaks are in culverts and the Stora Ån-creak is straighter.

Layer 1: Topography , Översiktplan, ÖP (2009) Göteborgs Översiktsplan 2009. Gothenburg: Gothenburg municipality
Layer 2: Frölunda 1979. Arkivet för bygg, plan och lantmäteri (2013) Frölunda 1979. Gothenburg: Gothenburg municipality
Layer 3: Enhancement of water, authors drawing

1920: the village Kannebäck by the inner part of Askimsviken -Välen and the creak Stora Ån was an area where the farmers alternated between fishing, cattle breeding and farming. The picture shows how farming has shaped the landscape, the bare rocks from heavy grazing, the small fileds following the topology and the unexploited shoreline towards the shallow fishing waters.

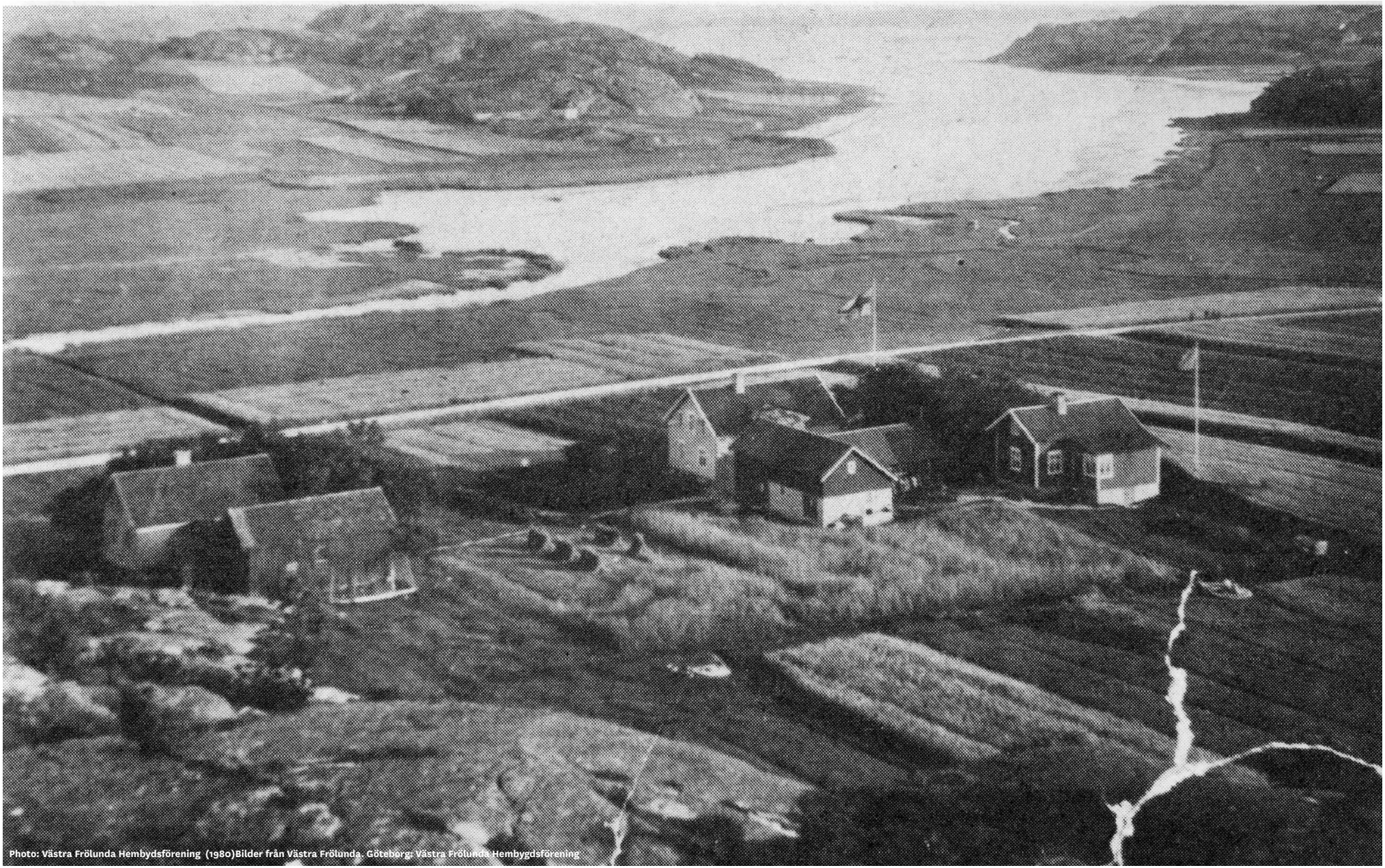


Photo: Västra Frölunda Hembydsförening (1980)Bilder från Västra Frölunda. Göteborg: Västra Frölunda Hembygdsförening

2013. The housing north of the former village Kannebäck is transformed into block houses by Opaltorget. The shore line along Välen is today a nature area managed by Frölunda Naturvårdsförening/ Frölunda Nature Care Association. The landscape has radically changed from 1920, through new landuse. The hills are now forested, the bay's outer part is a bath and sailboat harbour and the inner part is pastureland.

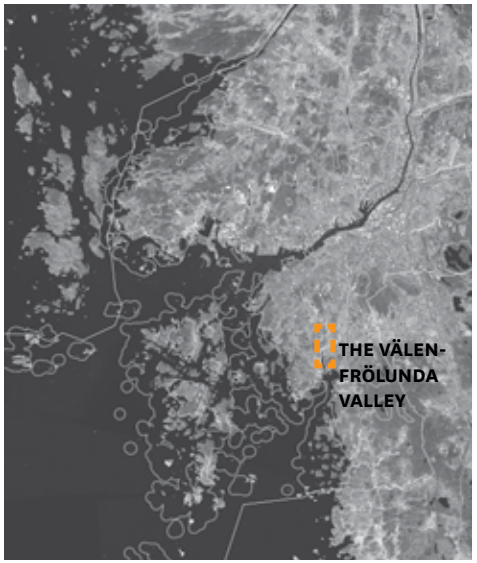
"Blue wedges" -valuable regional water links

Layer 1:Orthophoto at Hitta.se (2013) Göteborg (online) available at: http:// www.hitta.se
Layer 2: Topography , Översiktplan, ÖP (2009) Göteborgs Översiktsplan 2009. Gothenburg: Gothenburg municipality
Layer 3: Valuable green structures. "Liten Grönplan" , Göteborgs stad (2013) Standsutveckling 2035. Gothenburg municipality(online) available at: http://goteborg.se/wps/portal/enheter/projekt/stadsutveckling-2035/ [2013-08-15]

National interest for fishing

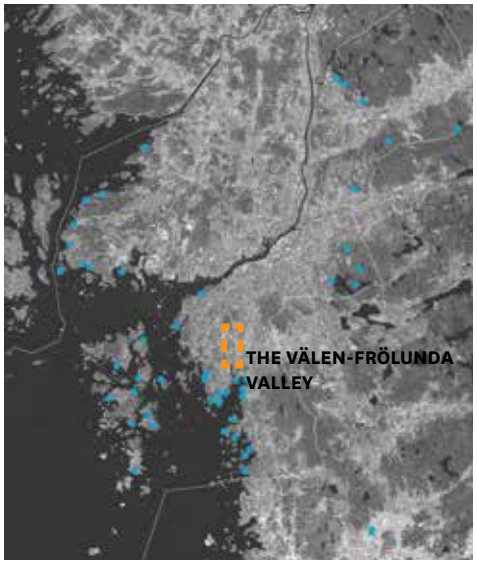
Layer 1:Orthophoto at Hitta.se (2013) Göteborg (online) available at: http:// www.hitta.se
Layer 2: Topography , Översiktplan, ÖP (2009) Göteborgs Översiktsplan 2009. Gothenburg: Gothenburg municipality
Layer 3: National interests according to the environmental act, map 3, Översiktplan, ÖP (2009) Göteborgs Översiktsplan 2009. Gothenburg: Gothenburg municipality

Beach protection



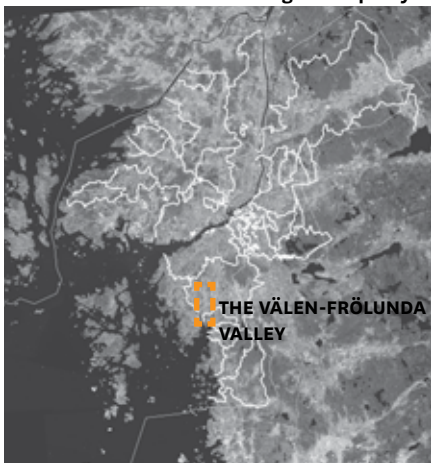
Layer 1: Orthophoto at Hitta.se (2013) Göteborg (online) available at: http:// www.hitta.se
Layer 2 :Beach protection, rules and Recommendations, map 2, Översiktplan, ÖP (2009) Göteborgs Översiktsplan 2009. Gothenburg: Gothenburg municipality

Public beaches



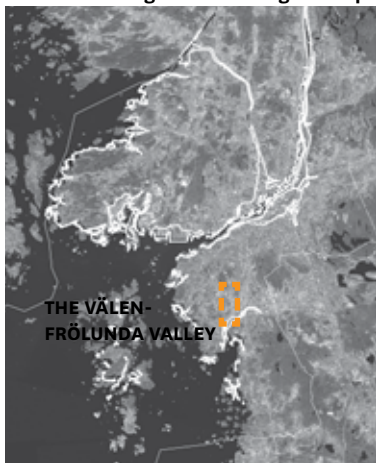
Layer 1: Orthophoto at Hitta.se (2013) Göteborg (online) available at: http:// www.hitta.se
Layer 2 : Public baths Gothenburg city (2013) Badplatser, utomhusbad (online) available at: http://goteborg.se/wps/portal/invanare/kultur-o-fritid/friluftsliv-natur-och/badplatser-utomhusbad/ [2013-08-16]

Catchment areas in Gothenburg municipality



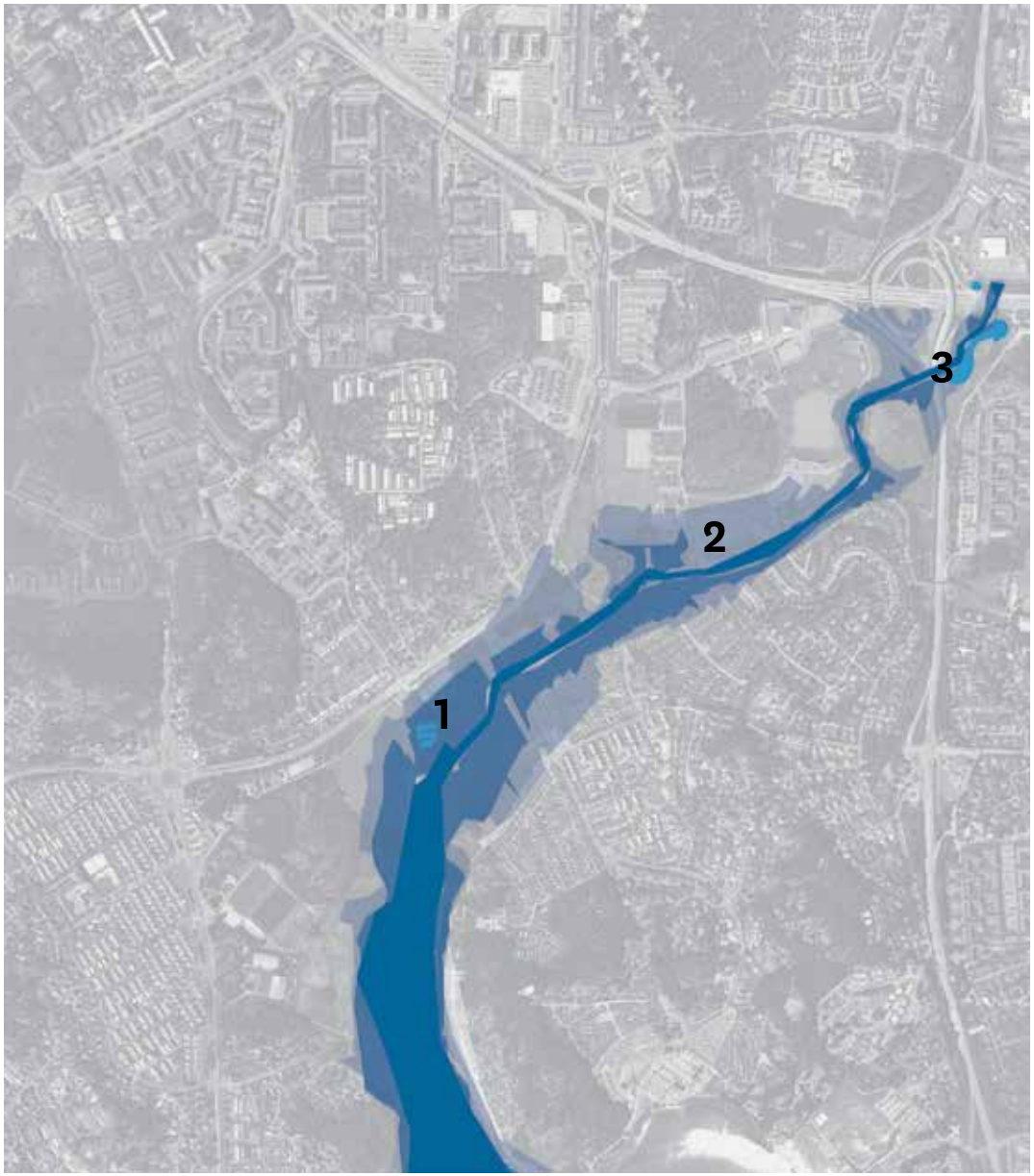
Layer 1:Orthophoto at Hitta.se (2013) Göteborg (online) available at: http:// www.hitta.se
Layer 2 :Karta OPA- Avrinningsområden, Fördjupad Översiktsplan Vatten (2002). Verktyg för stadplanering Göteborg. Gothenburg: Gothenburg Municipality

Risk for flooding in Gothenburg municipality



Layer 1:Orthophoto at Hitta.se (2013) Göteborg (online) available at: http:// www.hitta.se
Layer 2 : Rules and Recommendations, map 2, Översiktplan, ÖP (2009) Göteborgs Översiktsplan 2009. Gothenburg: Gothenburg municipality

The Välen- Stora Ån- catchment. The maps shows the forcasted flooding of the area.



To live by and work off the sea has been the history of the inhabitants in Gothenburg since the first settlers, as in other port cities. The sea is of economic importance for fishery and the shipping industry. The beach protection is such an act that shall protect over-exploitation of the zone between land and sea, a zone considered recreational for people and an important habitat and buffer zone for animals an ecosystem services.

From the modernist housing era until today the landscape has been drained from water, which makes the existing recipients hold larger amounts of water.

According to IPCC the sea level rise is a considerable factor when planning for the future. Gothenburg have invited teams of architects to work upon the issues of sea level rise in the sensitive harbour areas, but no strategies has been carried out for the coast line as such. The Välen- Stora Ån catchment, is part of the Gothenburg coastline that has not been studied in depth, but will accordingly change in the future due to sea level rise.

HOW IS IT POSSIBLE TO PROTECT HOUSING AREAS, ECOSYSTEM PATCHES, AND INFRASTRUCTURE BY THE VÄLEN-STORA ÅN WATER COURSE WHEN SEA LEVEL RISE?

FUTURE WATER LEVELS IN THE VÄLEN-STORA ÅN CATCHMENT

1. +11.5 m (1.43 RH70), high flood levels today

2. +12.5 m (1.43 RH70), UN IPCC trajectory year2100 (+0.2- + 1.4m)

3. stormwater retention ponds

Layer 1: Orthophoto (2013) Map archive, Chalmers University of Technology, Dep. of Architecture Gothenburg.
Layer 2. Etremt väder. Havet. (2002) Fördjupad Översiktsplan Vatten. Verktyg för stadplanering Göteborg. Gothenburg: Gothenburg Municipaiity

Layer 1: Ortophoto Välen -Frölunda (2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 2: authors drawing

SITE 7 VÄLEN LANDFILL

Layer 1: Orthophoto (2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 2: Topography, Gothenburg primary map,(2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 3: Section-window and site (authors drawing)

SECTIONS & PLAN

TEMPORALITY / FUNCTIONALITY

Biotope: Pine forest on bare rock
Tree layer: Pinus sylvestris, Sorbus intermedia
Field layer: Lonicera periclymenum, Calluna vulgaris

"Sportarena Västra Frölunda"
tennis, badminton and gym

Biotope: Ruderal species:
Main species: Urtica dioca and Taraxacum.

Site 7
VÄLEN LANDFILL

Reed belt on the floodable shore line

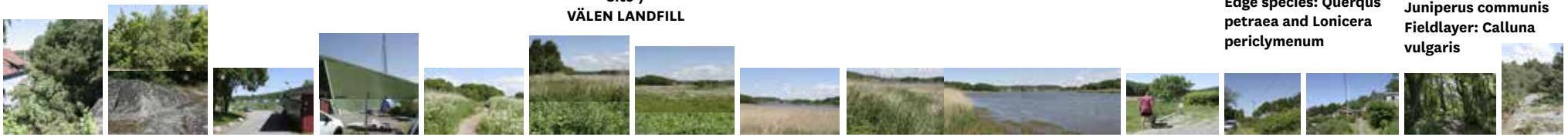
Välen

Välen allotment association, compost

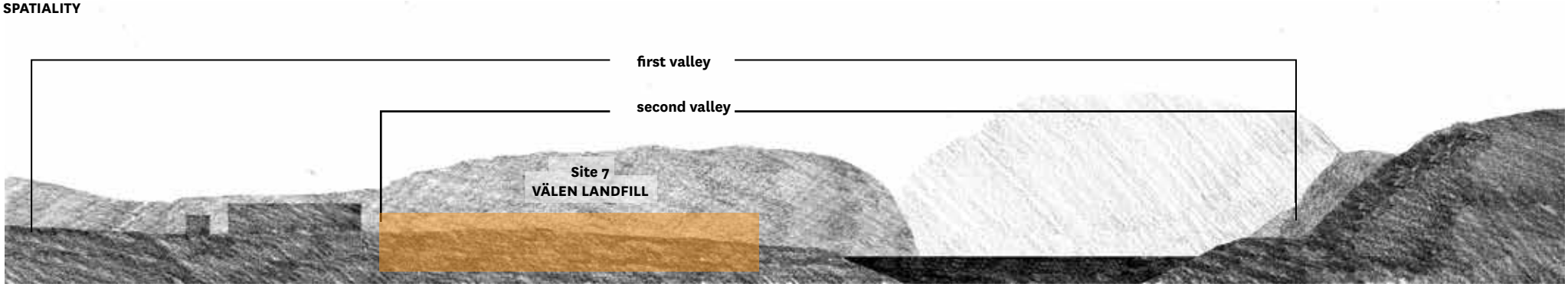
Välen allotment association built 1958

Edge species: Querqus petraea and Lonicera periclymenum

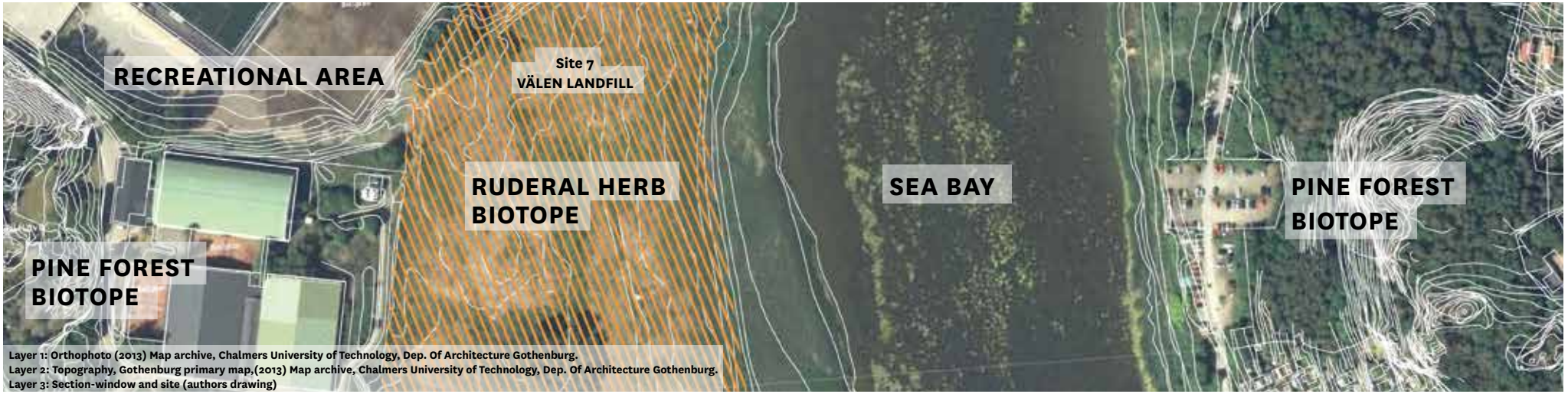
Biotope: Pine forest on bare rock.
Tree layer: Pinus sylvestris.
Shrub layer: Juniperus communis
Fieldlayer: Calluna vulgaris



SPATIALITY



PLAN



Layer 1: Orthophoto (2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 2: Topography, Gothenburg primary map,(2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 3: Section-window and site (authors drawing)

Ruderal species inhabit the landfill

There is a walkway along the landfill towards the Välen nature area.

The landfill is positioned right next to the Välen bay, the pictures show the view towards Askimsviken with sailboat harbour and public baths.

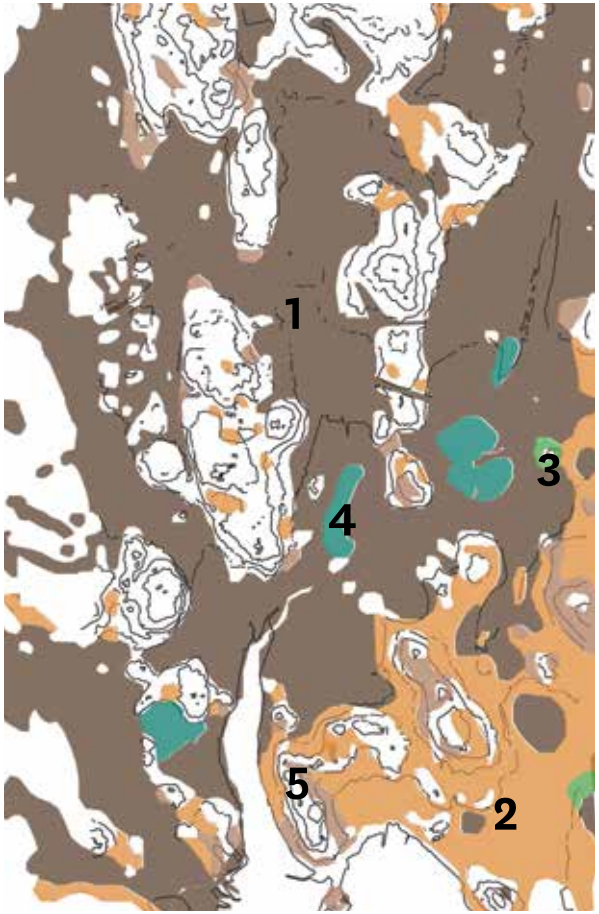
Layer 1: Orthophoto (2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 2: Excerpts from Topography, Gothenburg primary map,(2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 3: Distances, authors drawing

ISSUE SOIL REMEDIATION

In the Gothenburg region clay soils (brown) and moraine (light green) have been deposited in the valleys.

Layer 1: Topography , Översiktplan, ÖP (2009) Göteborgs Översiktsplan 2009. Gothenburg: Gothenburg municipality
Layer 3: soil, based on SGU,Svergies geologiska undersökningar (2013) Kartvisare - jordarter (online) available at: http://www.sgu.se/sgu/sv/produkter-tjanster/kartvisare/kartvisare_jord.html [2013-08-16]

The valley has mainly clay soils but also ice-deposited mixed soils.



Layer 1: Topography , Översiktplan, ÖP (2009) Göteborgs Översiktsplan 2009. Gothenburg: Gothenburg municipality
Layer 3: soil, Gothenburg city, soil map (2013) Jordarter. Geologgen Gothenburg city. Gothenburg: Gothenburg municipality.

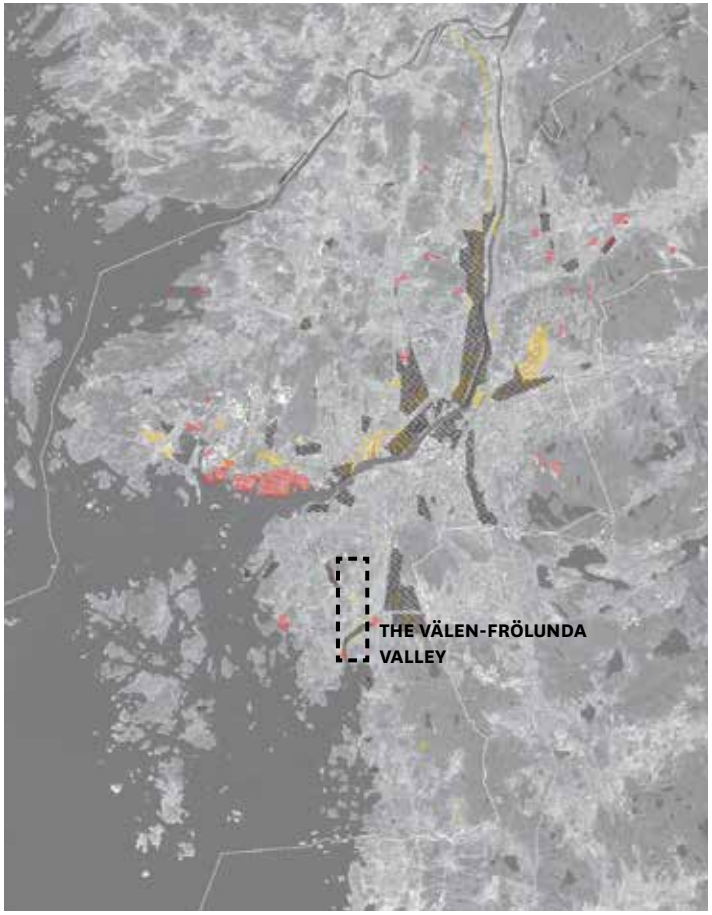
1. **Clay**
2. **Surge sediments**
3. **Ice-flood sediments**
4. **Filling**
5. **Moraine**

The soils in the area is polluted or replaced with landfills

Layer 1: Topography , Översiktplan, ÖP (2009) Göteborgs Översiktsplan 2009. Gothenburg: Gothenburg municipality
Layer 3: soil, Gothenburg city, soil map (2013) Jordarter. Gothenburg: Gothenburg municipality.

1. **Landfill**
2. **Polluted soil**

Polluted soils and landfills in Gothenburg municipality



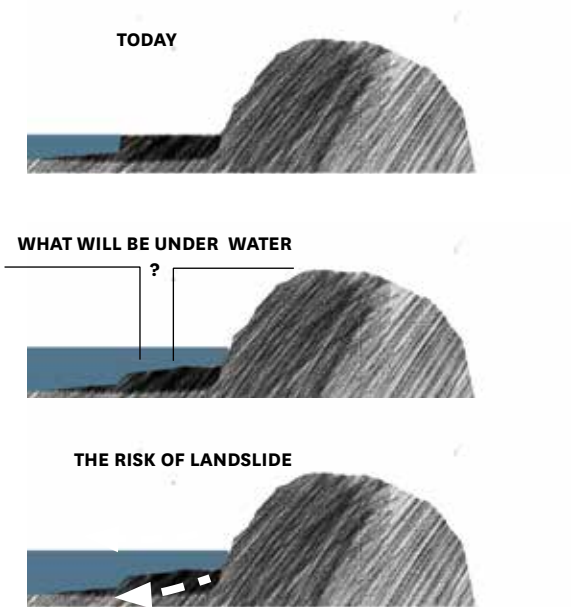
Layer 1:Layer 1: Orthophoto at Hitta.se (2013) Göteborg (online) available at: http:// www.hitta.se
Layer 2: soil, Gothenburg city, soil map (2013) Jordarter. Geologgen Gothenburg city. Gothenburg: Gothenburg municipality.

Risk for soil pollution

Layer 1: Topography , Översiktplan, ÖP (2009) Göteborgs Översiktsplan 2009. Gothenburg: Gothenburg municipality
Layer 2: Risk for soil pollution based on FÖP, risk for soil pollution ((2013) Jordarter. Gothenburg: Gothenburg municipality.

Risk for landslide

Layer 1: Topography , Översiktplan, ÖP (2009) Göteborgs Översiktsplan 2009. Gothenburg: Gothenburg municipality
Layer 3: Risk for landslide, SBK (2013) Stabilitetskartan, Geologgen Gothenburg city. Gothenburg: Gothenburg municipality.



Heavy clay soils deposited from the inland ice and the bare rocky hills have been main actors in building up the Gothenburg area. The position of the hills and the clay soils are structuring what is located where.

The last century´s industrialization has contributed with a new type of material in the landscape: pollution and waste. Today industies leak out pollutants into the soil. Under capacity in the sewage plants release unfiltered waters into the sea and the undegradable matter such as household and industry sludge have been filled up and sealed in landfills along the Gotheburg coast. Välen Landfill is one of those sludge landfills, about 30 meters from the Välen bay.

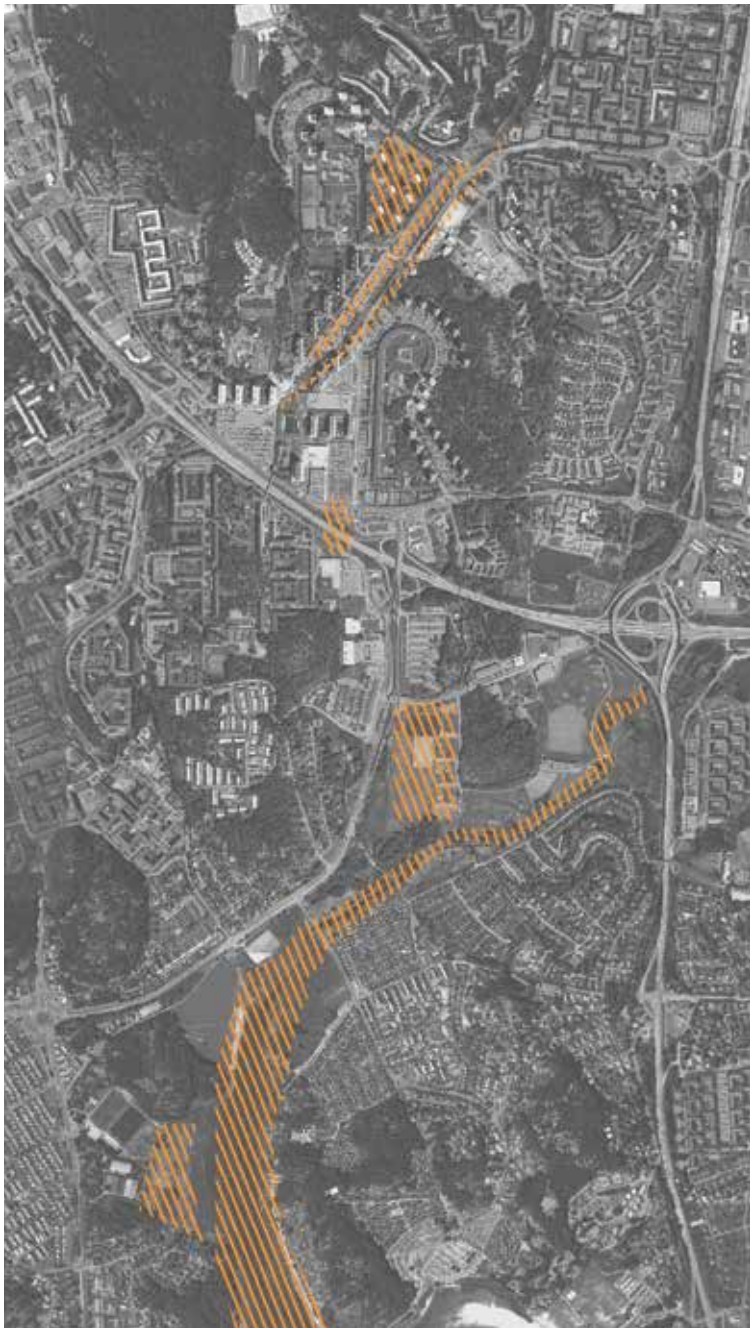
Climate change will alter the Gothenburg landscape by higher sea levels, increased precipitation and temperature rise:

HOW IS IT POSSIBLE TO HANDLE POLLUTED SOILS TODAY AND AS SEA LEVEL RISE?

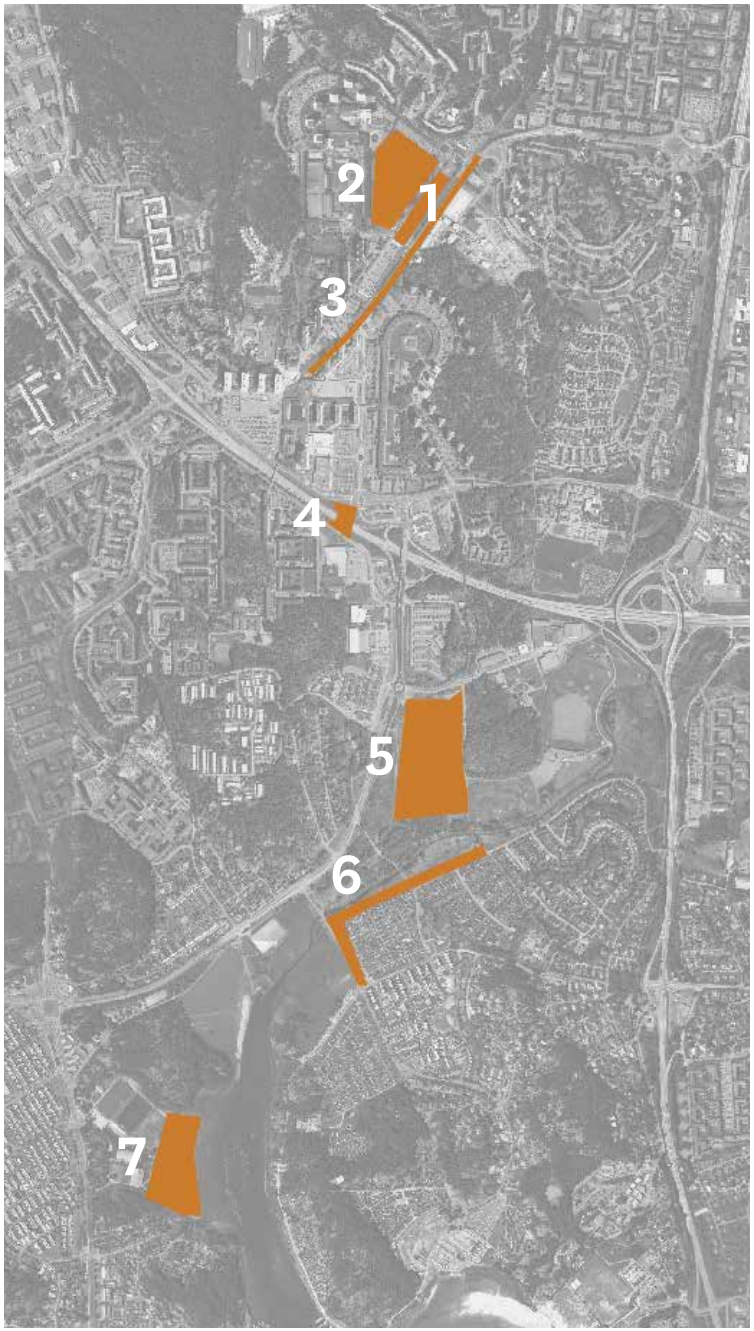
2.2 SITE **ALTERATION**

Site Alterations point at the possibility of the sites to be altered in order to meet certain disturbances and needs, calibrating and rearranging what is already there but adding other functions and experiences - diversifying the sites.

Site Alteration is a design strategy based on one main concern that is highlighted on each site. Design principles are developed for each concern, and a possible network of actors are detected, that would have to collaborate in order to make the alteration happen.



Layer 1: Ortophoto Välen -Frölunda (2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg
.Layer 2: authors drawing



ALTERED SITES

The sites on the map represent the physical location of the alterations proposed. This is the areas of control, but the alterations exceed these locations as sites always are interconnected with other sites. The site located alterations are thus influenced by a range of actors and stakeholders which are not only bounded to the site but connected to it in a network. The alterations also have effect on a larger an area and actors difficult to map as the effects can be climatic, through movement, personal, political, the physical extention or development of the site etc.

1 MANDOLINGATAN STORMWATER PARKING LOT

2 MANOLINGATAN COURT YARD CISTERNS

3 TRAM LINE MEADOW

4 VÄLEN-FRÖLUNDA PASSAGE

5 VÄLEN WETLAND FIELD

6 STORA ÅN - VÄLENVIKEN WATERFRONT DYKE

7 VÄLEN LANDFILL FORUM

Layer 1: Ortophoto Välen -Frölunda (2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 2: authors drawing

SITE 1 **MANDOLINGATAN STORMWATER PARKING LOT**

Layer 1: Orthophoto Gothenburg Municipality, Geodataavdelningen (2013) Kartor och geodata, Göteborgs stad. Gothenburg: Gothenburg Municipality
Layer 2: Excepts from Gothenburg primary map,(2013) Map archive, Chalmers University of Technology, Dep. of Architecture Gothenburg
.Layer 3: Section-window and site (authors drawing)
Layer 4: Distances, authors drawing

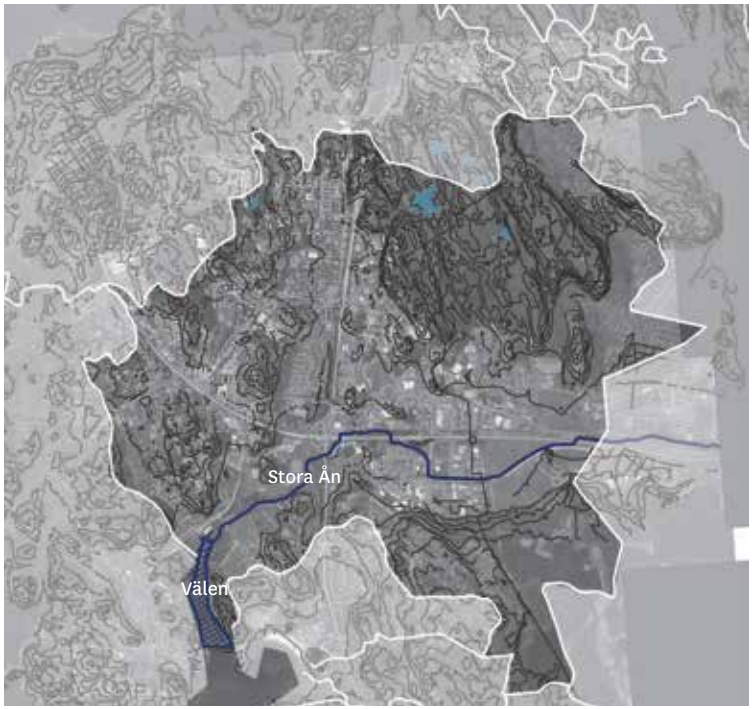
CONSIDERATION

The continuation of sealing surfaces through building in the area, cause an increasing volume of stormwater and puts high pressure on the stormwater infrastructure. The grey water from roads and parking spaces is polluted which contribute to the high levels of organic matter, phosphorus and nitrogen in both Stora Ån and Välen bay (Pettersson, 1999; Årsrapport 2011, 2011b; 2011b).

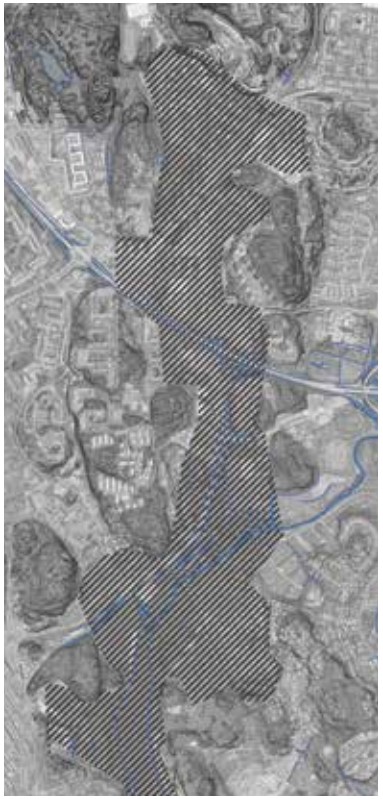
According to SMHI, the Swedish Meteorological and Hydrological Institute, the yearly precipitation in the Gothenburg region will increase with 10-30 % from 894 mm to 983-1162 mm per year (1991-2008). 13 % of the increased amount of rain will fall during autumn. The spring is forecasted to be dryer. This will change the access of water during the growing period. These yearly changes are forecasted to start to have an impact on the quality and the flow of water reaching the recipient.

THE CONSIDERATION IS TO REMEDIATE POLLUTED GROUND STORMWATER

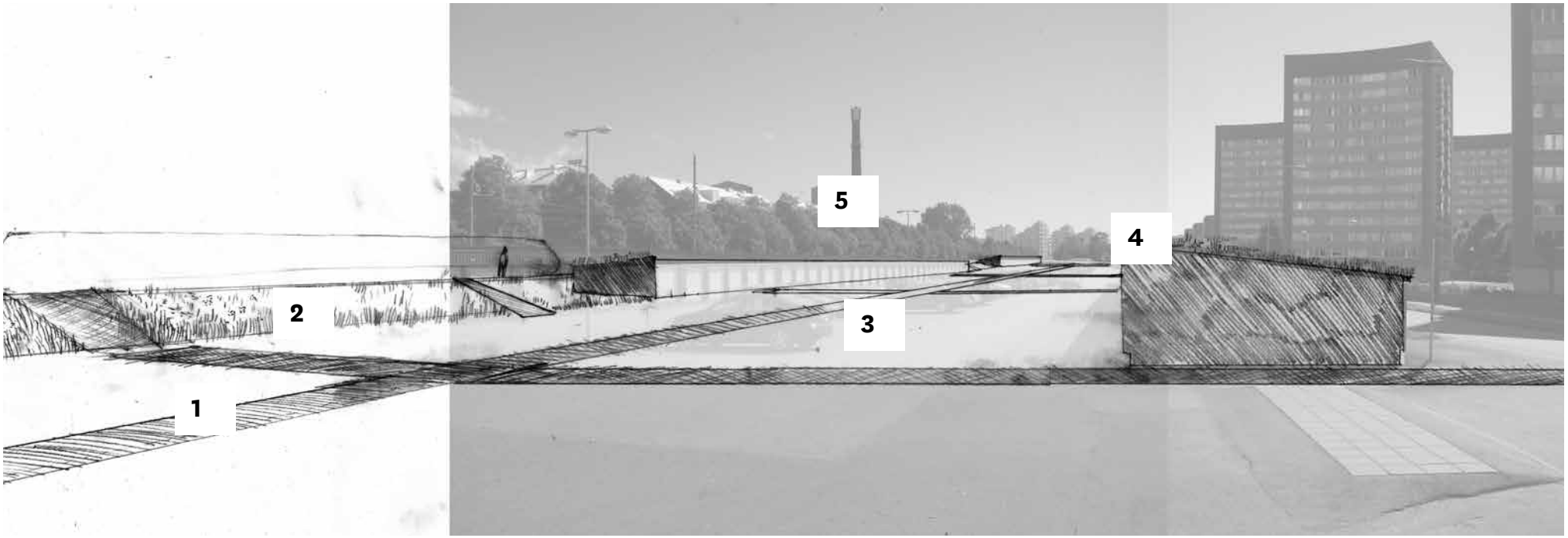
The Välen- Stora Ån- catchment. Area 2208 ha



The extenden Välen-Frölunda valley 224,2 ha = 2,24 km²



Sealed sufaces: parkinglots and roads in the extenden Välen-Frölunda valley



1
Open stormwater retention creaks, are placed in the low point of the parking lot area. The creaks are covered with a permeable mesh to catch the surface water runoff and still act as an even continuous floor for flexible use.

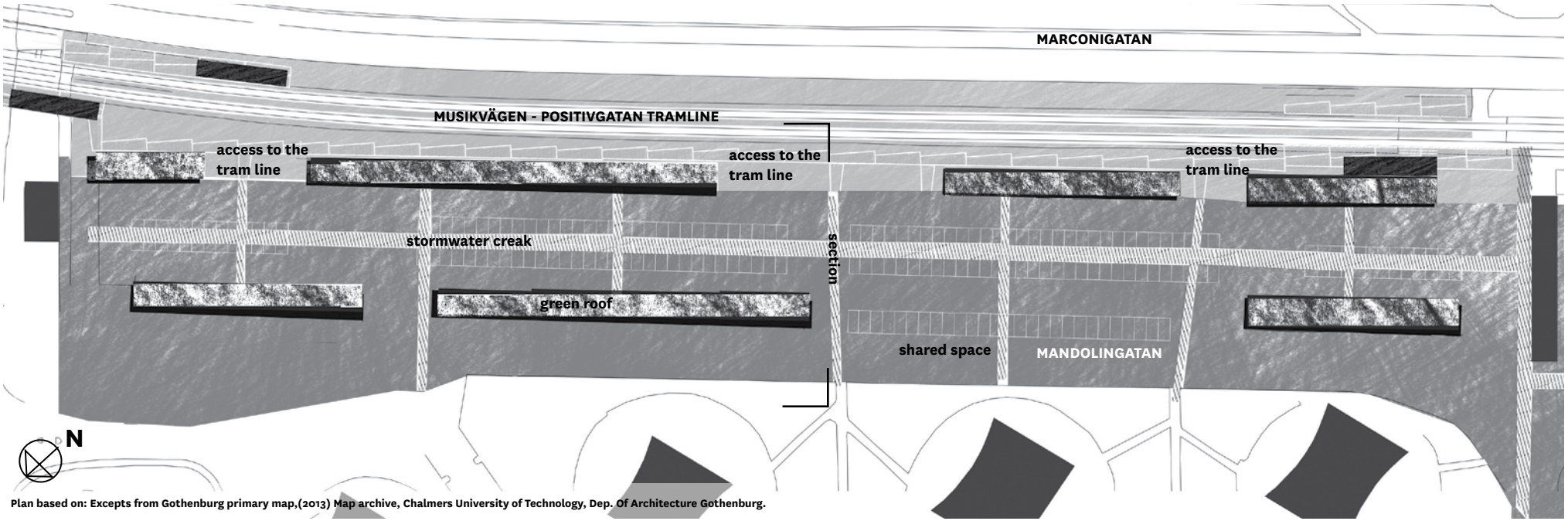
2
Some of the garages are taken away to give access to the tram line, and the tram meadow public green space. (See Site 3).

3
A coordination of parking spaces in Frölunda will allow the stormwater parking lot to temporarily become a local market place, or used for sports, gatherings etc.

4
Meadow roofs on the garage rooftops contribute to the remediation of surface water runnof, and increase biodiversity in the area.

5
Mandolingatan - Mandolingatan parking lots - Musikvägen -Positivgatan tram line area- one continuous shared public space

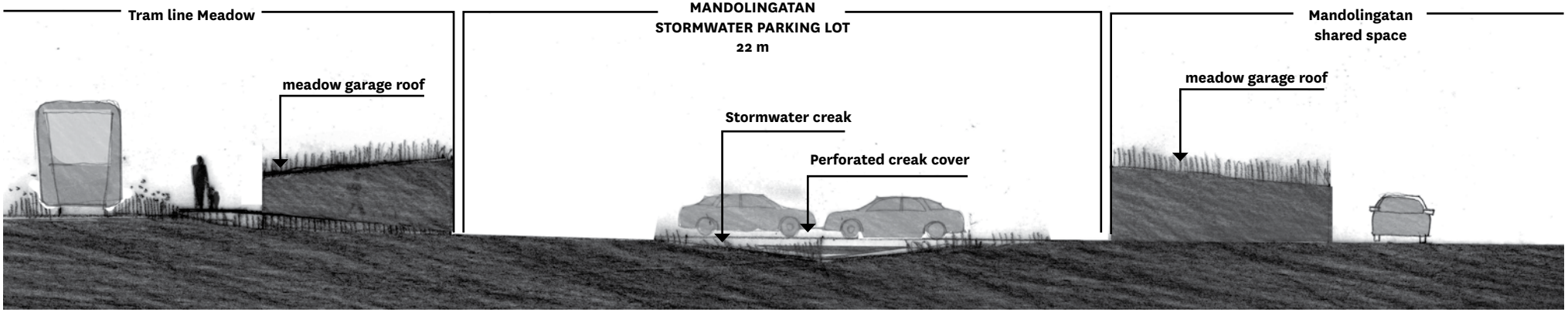
PRINCIPLE PLAN



Plan based on: Excepts from Gothenburg primary map,(2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.

PRINCIPLE SECTION

scale 1.200



ALTERATION PRINCIPLES

Create access between the different functional spaces: the street Mandolingatan - the Mandolingatan parking lot area - the Musikvägen -Positivgatan tram line area

Implement an open stormwater system in the low point of the streets and parking lots to catch the polluted surface runoff water.

Add structures to create multifunctional use and ecosystem services for example green roofs, vegetation for moist to wet habitat and flexible floor painting.

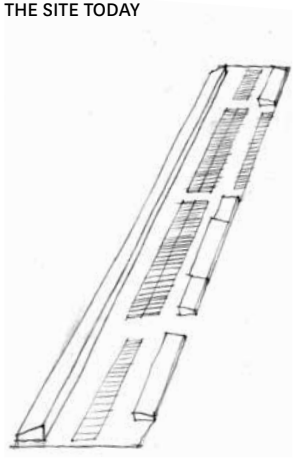
Reorganize the parking lot system over the day and month and year to create access to the parking surfaces for other uses.

PRINCIPLE STORMWATER COURSE

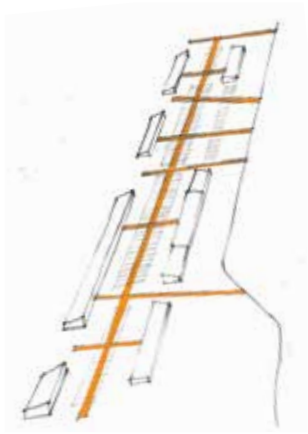
The Stormwater parking lot is part of a system of creaks that lead and the retend the water, following the low points in the valley.
The system will be showed in 3 sites, Site 1 the Stormwater Parking Lot, Site 4 the Välen-Frölunda Passage and Site 5 the Wetland Field.

NEGOTIATION

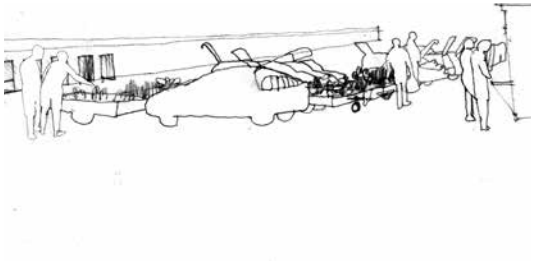
THE SITE TODAY



SITE ALTERATION

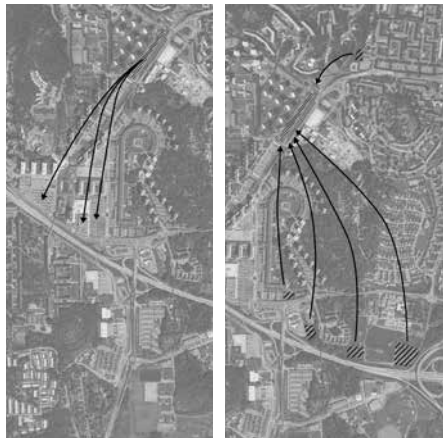


EXTENDED FUNCTIONS ON SITE. EXAMPLE:
Parking lot market place

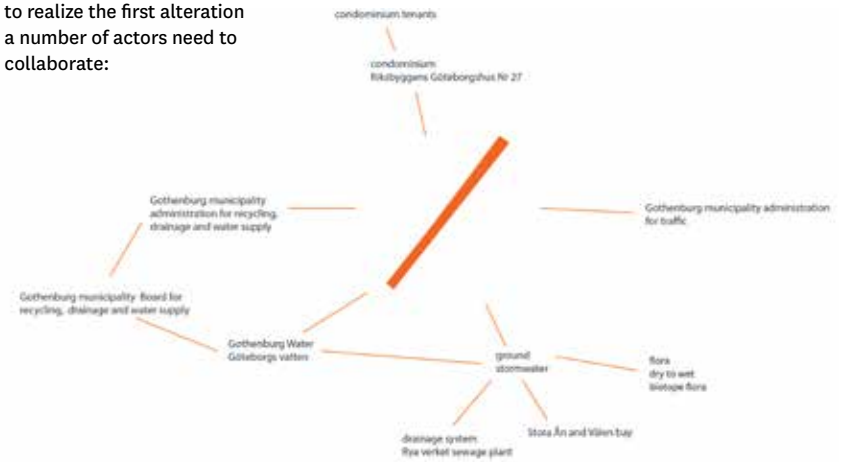


Due to the variation of use over the day on parking lots a rotation of the use of parking lots in the area would make the site alteration possible.

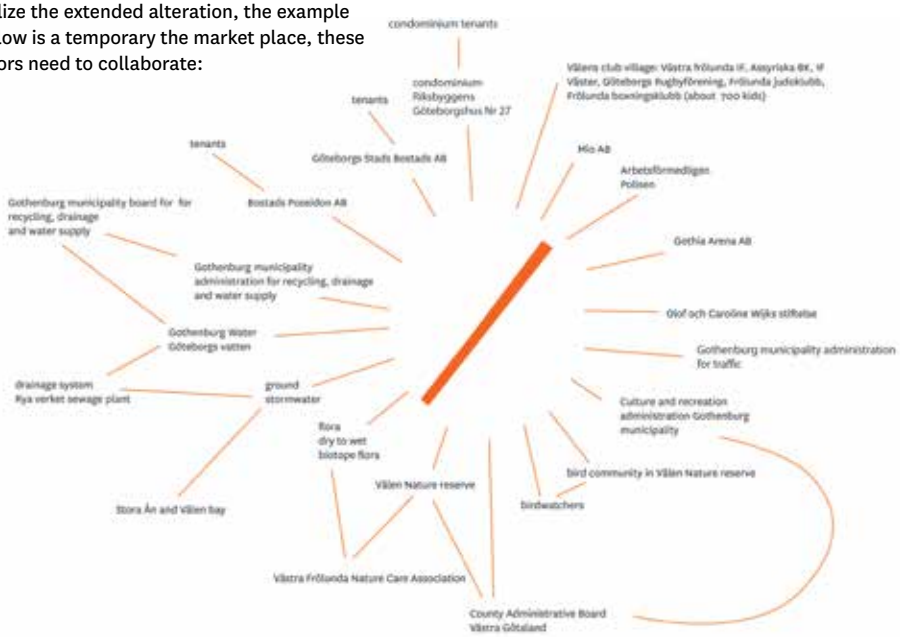
One possible use of the parking lot area is a returning vegetable market for local allotment farmers. Other uses could be, sports, fleemarket, dancing etc.



SITE NEGOTIATION. In order to realize the first alteration a number of actors need to collaborate:



SITE NEGOTIATION-EXTENDED. In order to realize the extended alteration, the example bellow is a temporary the market place, these actors need to collaborate:



SITE 2 **MANDOLINGATAN COURTYARD CISTERNS**

The Mandolingatan roofs are 4800 m² . With a yearly precipitation of 894 mm that gives 4290 m³ water.
With an increase of 10-30% precipitation, in the end of the century, gives 4710-5580 m³ roof top water.

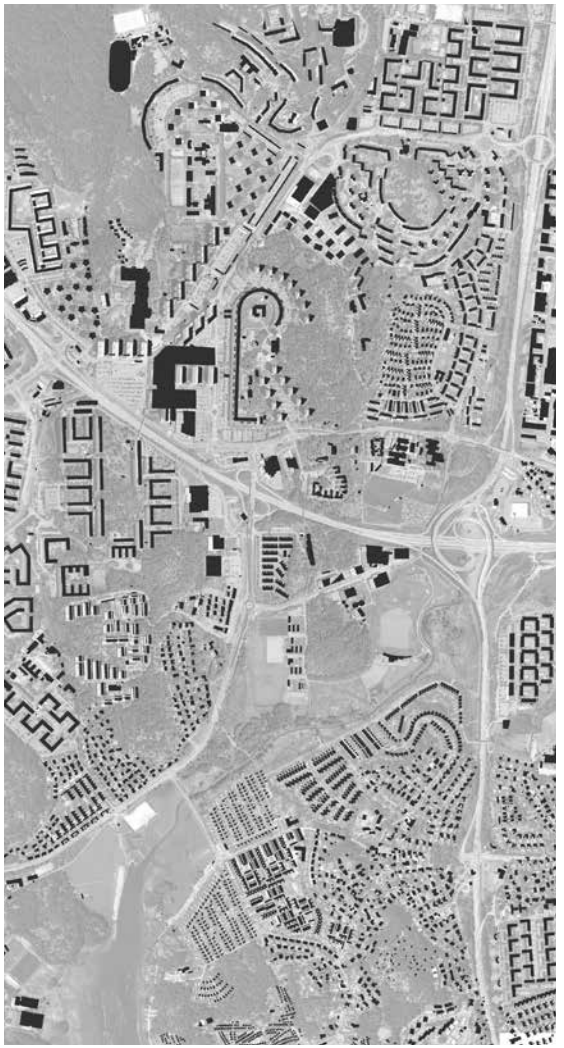
Layer 1: Orthophoto Gothenburg Municipality, Geodataavdelningen (2013) Kartor och geodata, Göteborgs stad. Gotheburg: Gothenburg Municipality
Layer 2: Excepts from Gothenburg primary map,(2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.Layer 3: Section-window and site (authors drawing)
Layer 3: Distances, authors drawing

CONSIDERATION

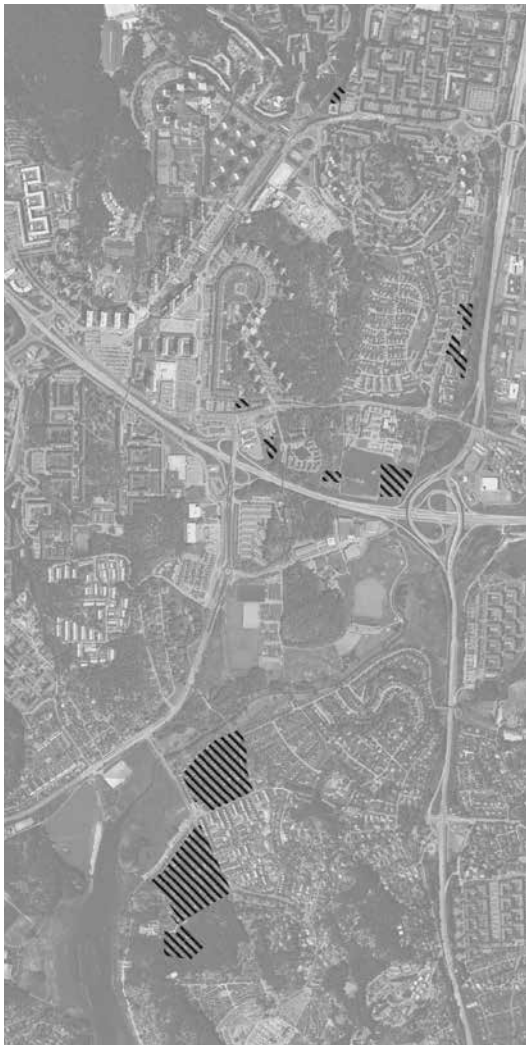
The northern part of the valley system is densely built with a high proportion of sealed surfaces. The rooftop surfaces in this court yard measure 4800 m^2, and with the amount of yearly precipitation of 894 mm that gives 4290 m^3 surface water that needs to be drained. Due to future climate changes the precipitation will increase in the area. The heavy clay soils on the locale does not allow good drainage, therefore the water is either piped to Ryaverken, Gothenburg sewage plant, or locally drained in built infiltration systems. The County Administrative Board (Länsstyrelsen), report on climate change says that the 4-6° higher temperature is expected within 2100. This will give 330 days of growth period per year (56 days of frost), compared to today the region has 210 days of growth (155 days of ground frost). The precipitation will increase with 10-30 %. The amount of rainfall will increase in the autumn and winter (50-60%) but decrease with 30-40 % in the main growth period, spring and summer. Which means less water in the main growing period and more water in the winter period.

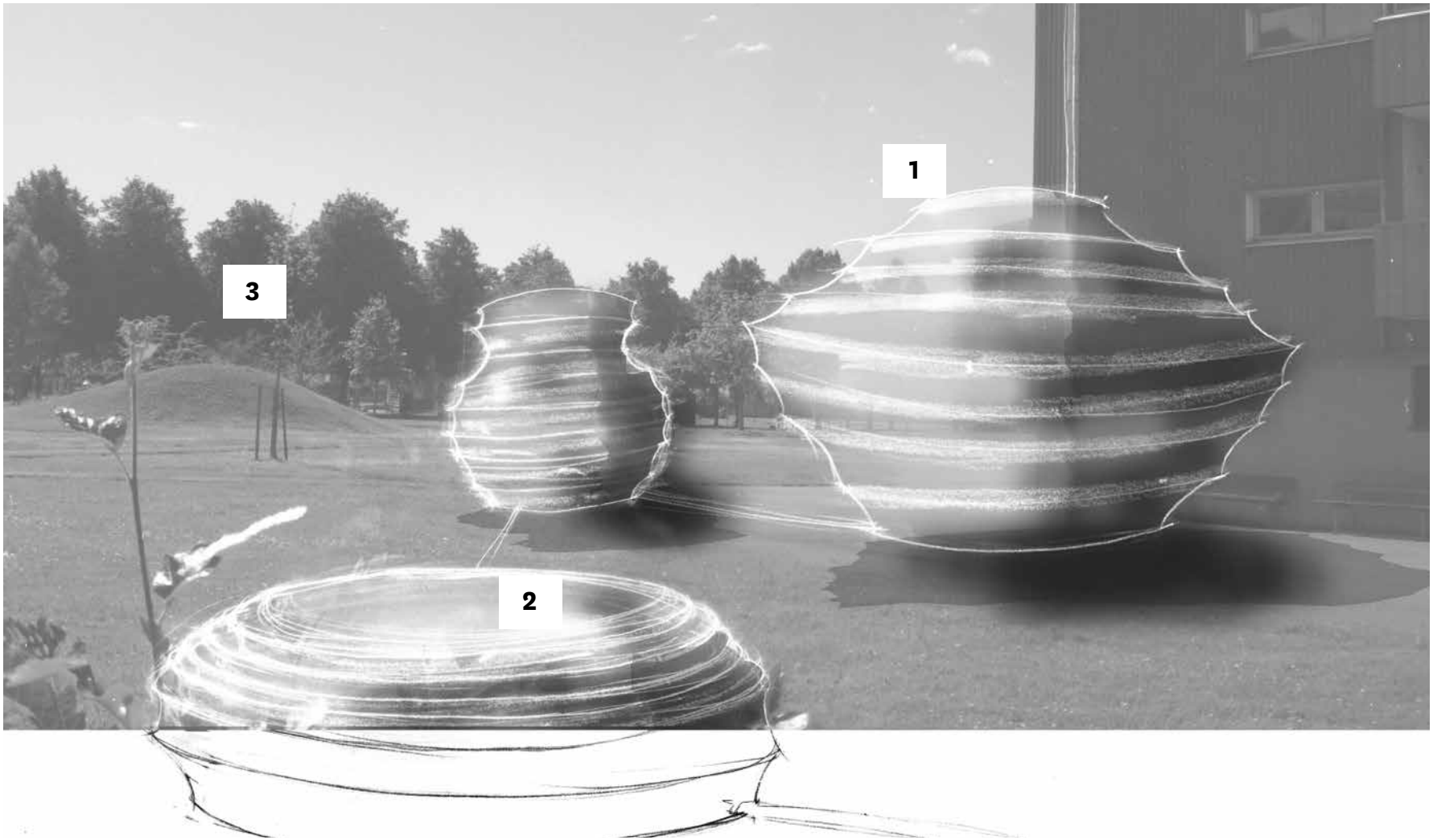
THE CONSIDERATION IS TO HARVEST STORMWATER.

Sealed surfaces: roofs.



The allotment gardens, are one example of water demanding vegetation.





1
Inflatable cisterns, work as a pedagogic tool as they indicate the amount of precipitation. When filled it is time to harvest

2
As the cisterns grow and shrink, the courtyard space change.

3
The cisterns collect the water mainly in the fall and winter for local use during the growth period, the dry spring and summer months.

Plan based on: Excepts from Gothenburg primary map,(2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.

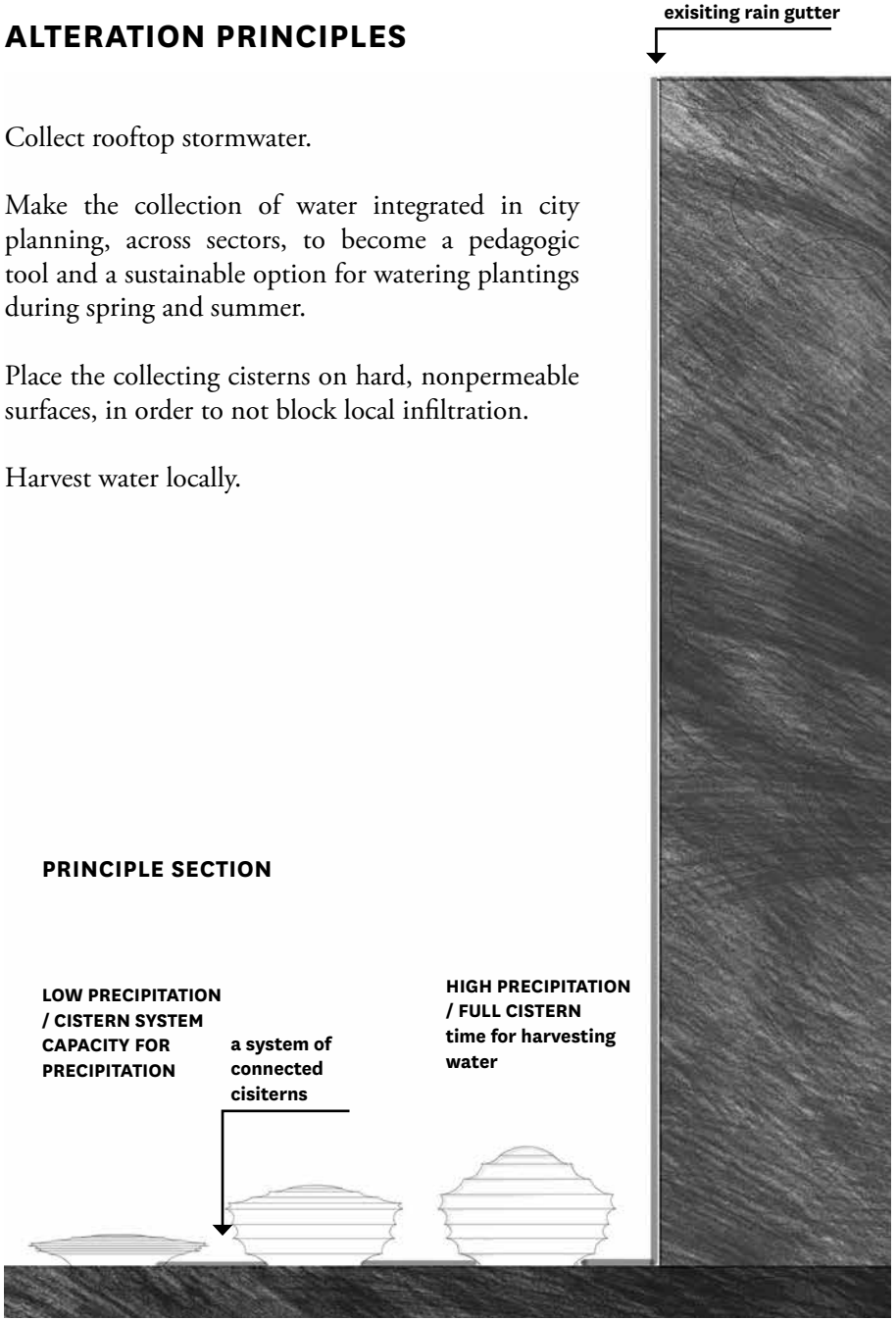
ALTERATION PRINCIPLES

Collect rooftop stormwater.

Make the collection of water integrated in city planning, across sectors, to become a pedagogic tool and a sustainable option for watering plantings during spring and summer.

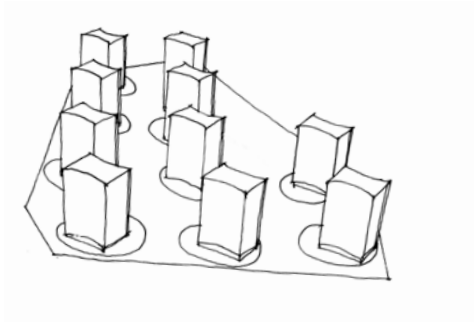
Place the collecting cisterns on hard, nonpermeable surfaces, in order to not block local infiltration.

Harvest water locally.

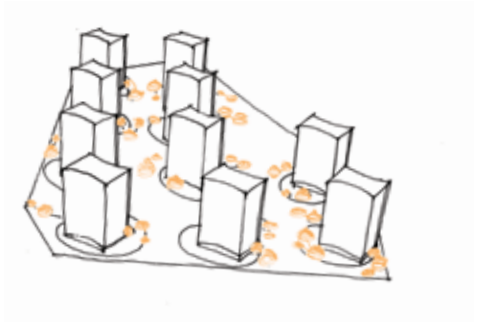


NEGOTIATION

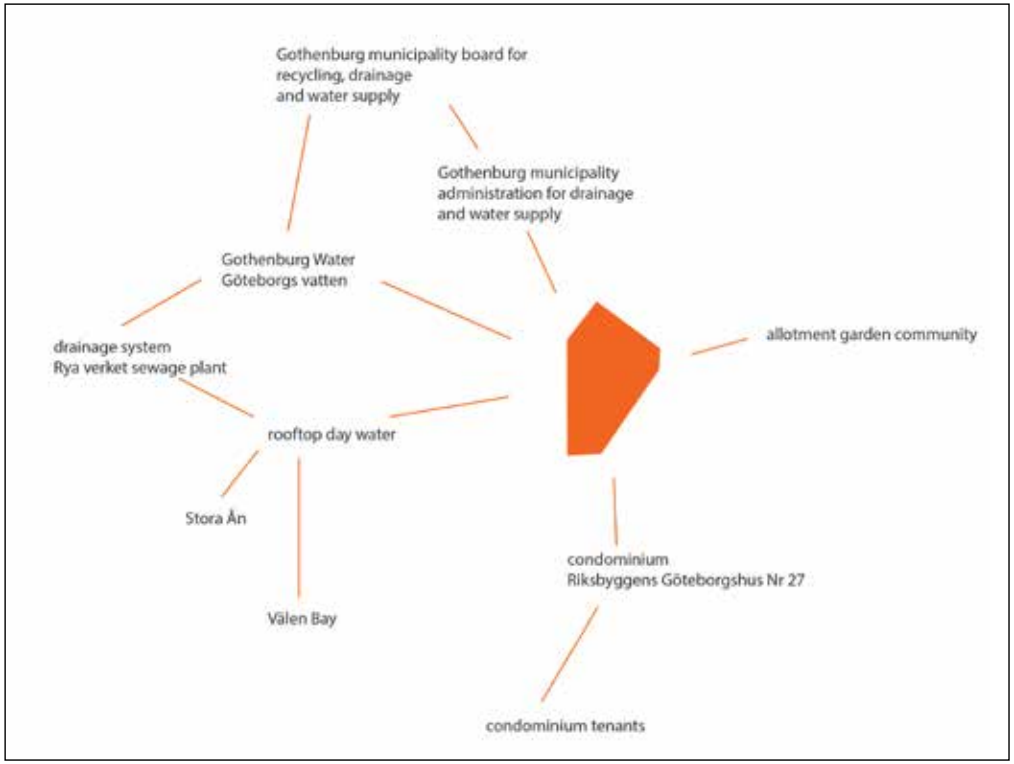
THE SITE TODAY



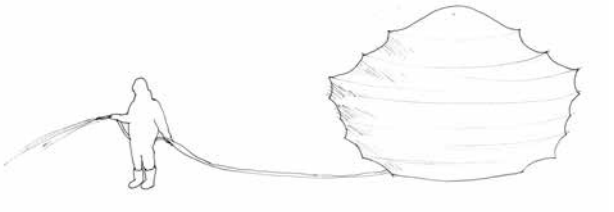
SITE ALTERATION



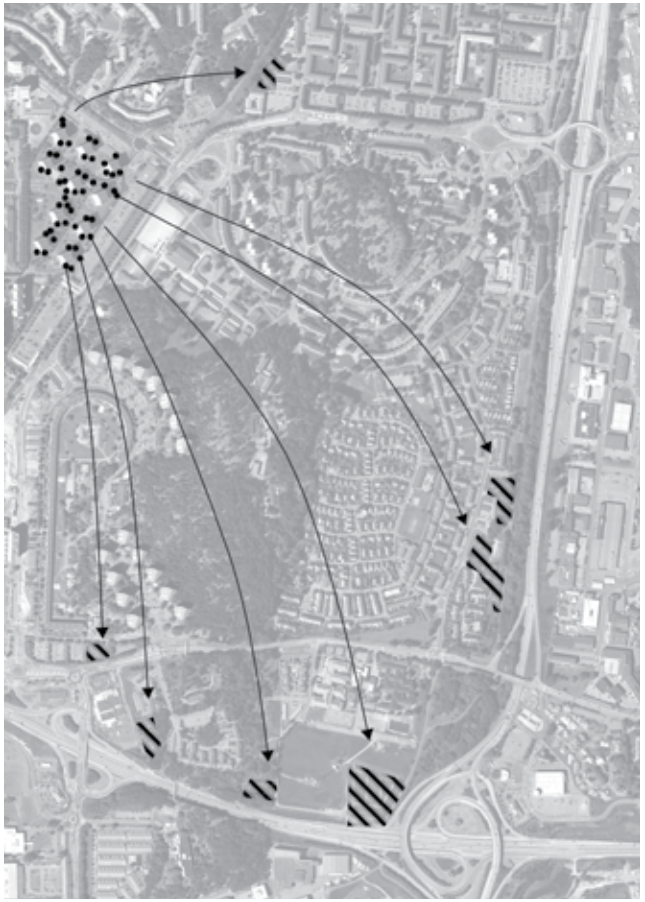
SITE NEGOTIATION. In order to realize the first alteration a number of actors need to collaborate:



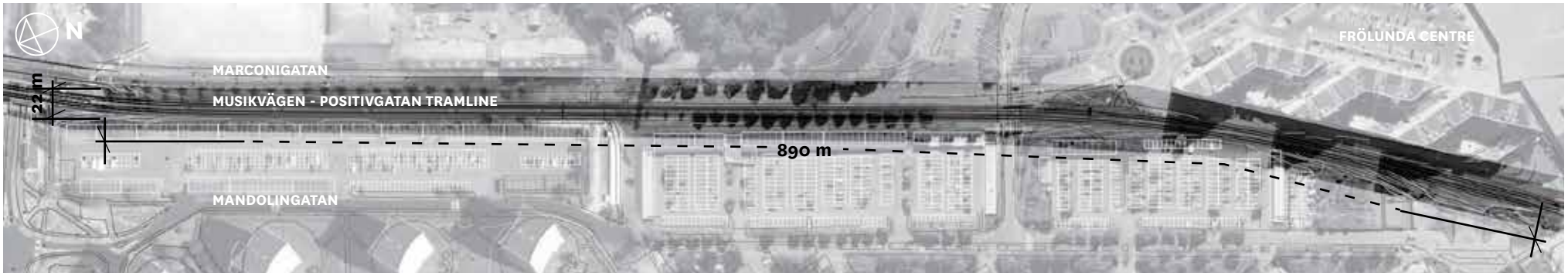
The selected water is used on site



The selected water distributed to the allotment gardeners



SITE 3 **TRAM LINE MEADOW NETWORK**



Layer 1: Orthophoto Gothenburg Municipality, Geodataavdelningen (2013) Kartor och geodata, Göteborgs stad. Gotheburg: Gothenburg Municipality
Layer 2: Excepts from Gothenburg primary map,(2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 3: Section-window and site (authors drawing)
Layer 4: Distances, authors drawing

CONSIDERATIONS

The landscape of the extended Välen-Frölunda valley, both the public space and the vegetation, are fragments of systems. The main public transport, the tram, is situated in the centre of the valley, but it is fenced off both visually and by physical elements, such as garage buildings, tree rows and fences. The vegetation consists of patches of ecosystems such as small groves, forested hills and grasslands. The biodiversity within existing ecosystems is competing with the forces of urban exploitation and climate change.

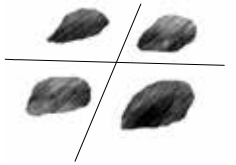
THE CONSIDERATION IS TO INTRODUCE BIODIVERSITY IN TO THE PUBLIC SPACE.

Densly built part of the valley

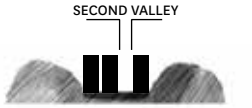
Dens vegetation in this part of the valley

Modern settlements are placed in the valley

Main roads and tram tracks are placed in the center of the valleys

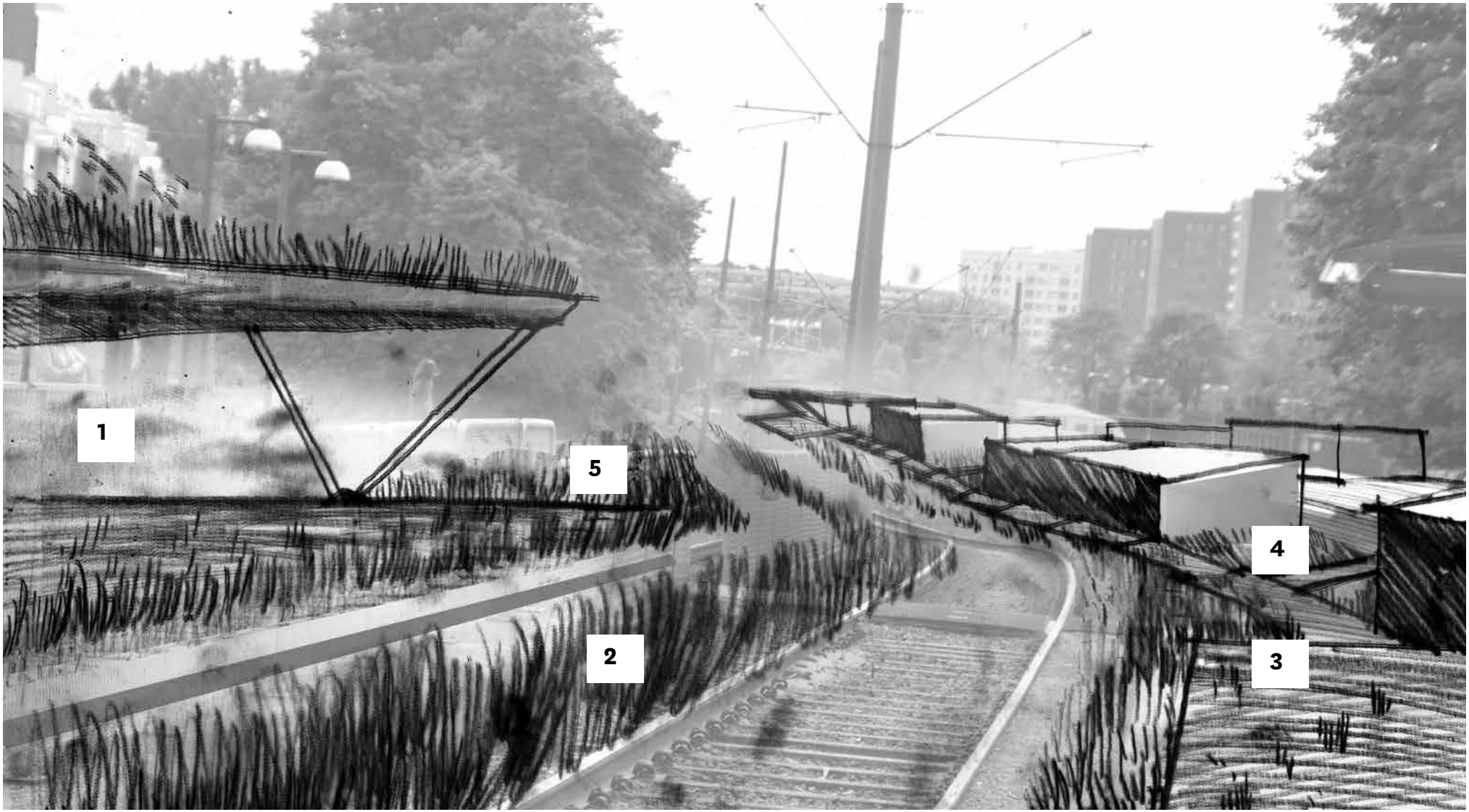


Type section of the dense northern part



Fragmented ecosystems both on the site scale and on the municipal scale.

The tram system are connecting places to each other and the rural to the urban.



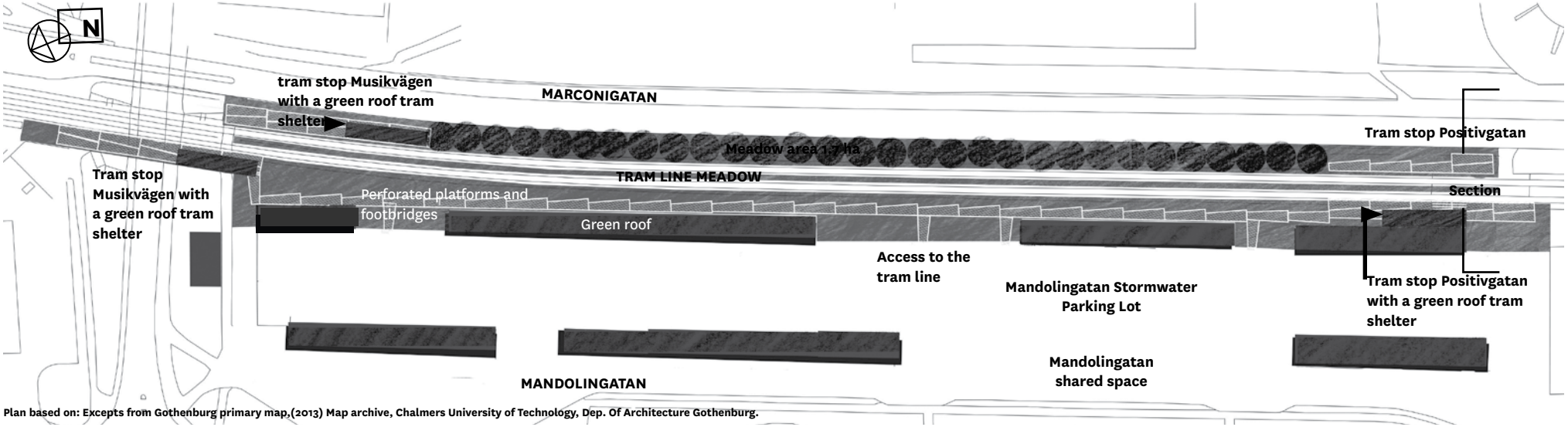
1
Platforms and tram stop shelters are integrated in the meadow system, by permeable meshed platforms and meadow roofed shelters.

2
The tram meadow is sawn from locally collected meadow hay seeds. The meadow is placed between and along the tram line tracks. Eventually the meadow system will be sawn all over the Gothenburg tram line network

3&4
A footbridge is installed along the tramline, connecting the tram track area and the tram stops with the existing and new walkways, to make the tramline area a public space

5
All fencing is taken away in order to make the tram line an accessible public green space

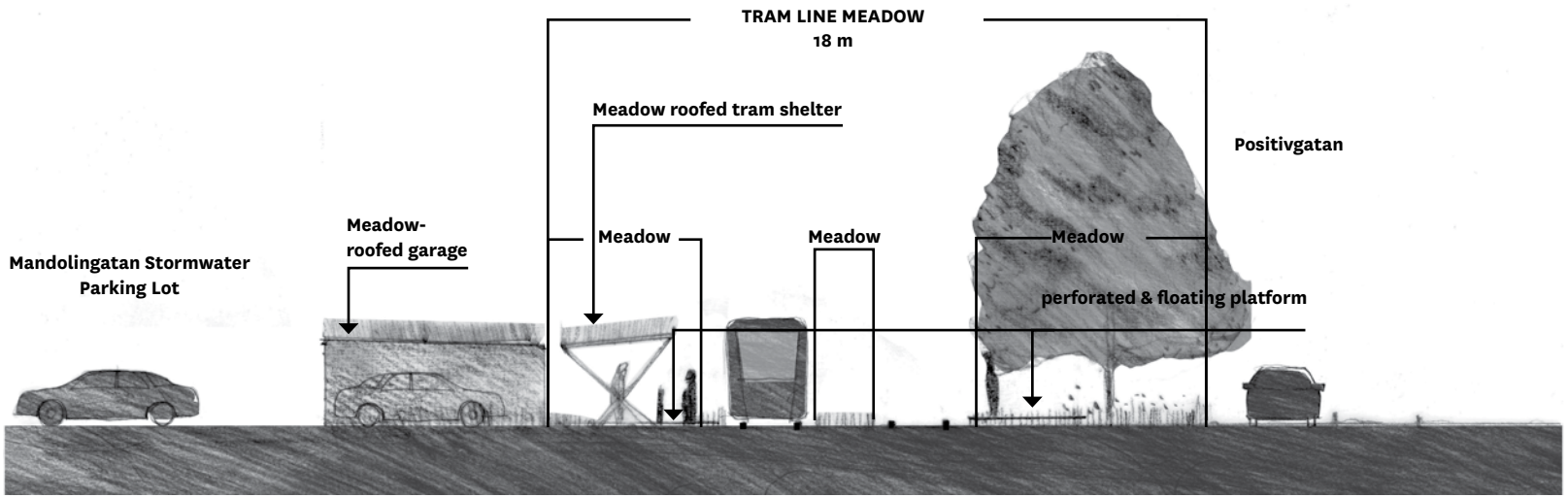
PRINICIPLE PLAN



Plan based on: Excepts from Gothenburg primary map,(2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.

PRINICIPLE SECTION

scale 1:200



ALTERATION PRINCIPLES

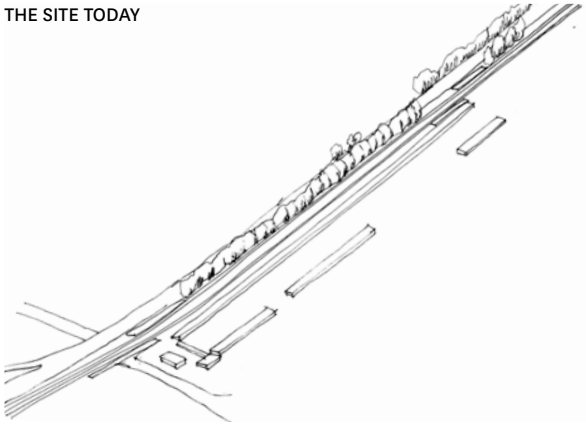
Create accessibility to the tram line area, to promote flow from and along the tram line/stops to the housing areas.

Use meadow seeds from the Gothenburg region for local habitat demands and for spreading an existing gene pool.

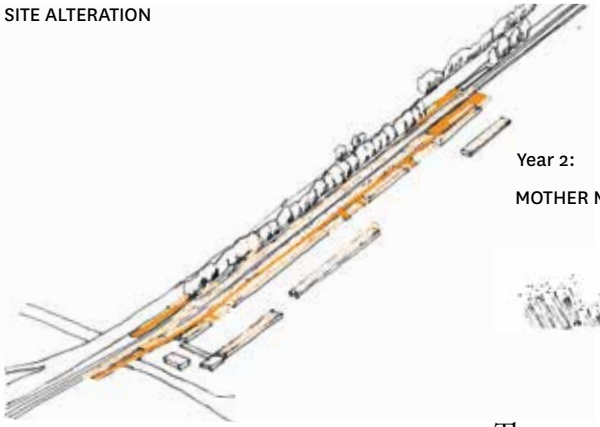
Develop the tramline to become an new kind of public green space in the suburbs

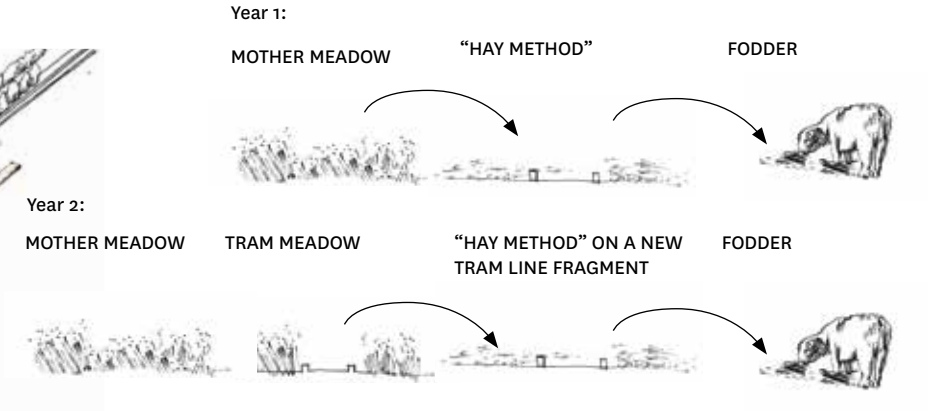
NEGOTIATION

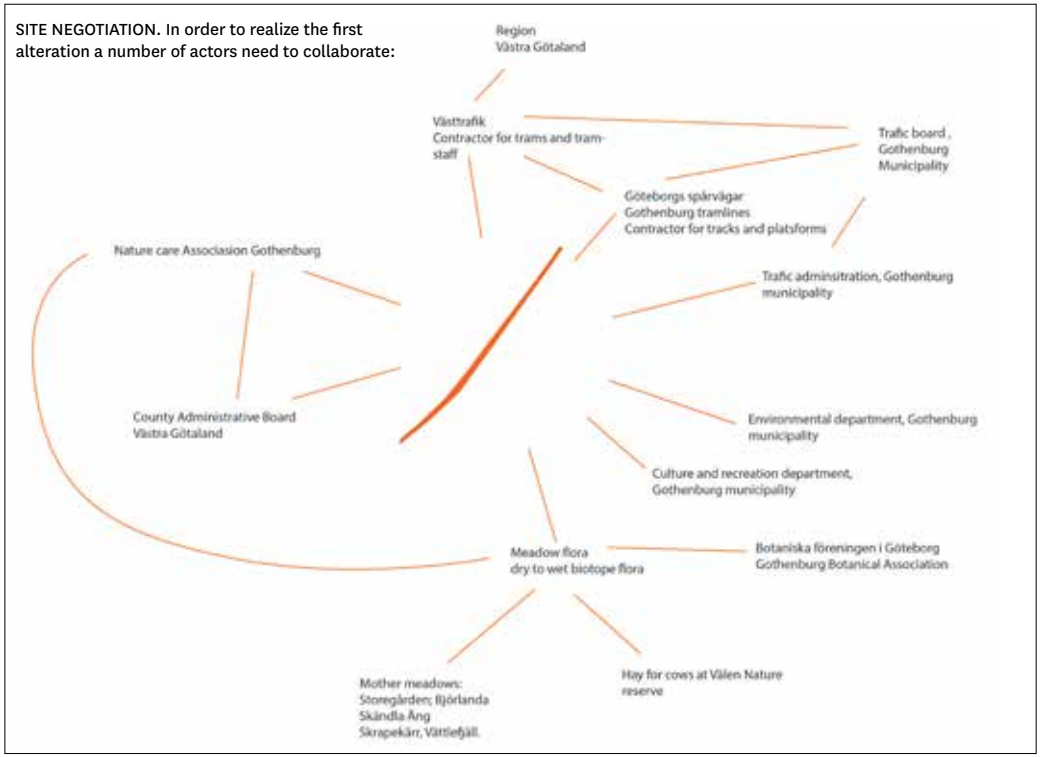
THE SITE TODAY



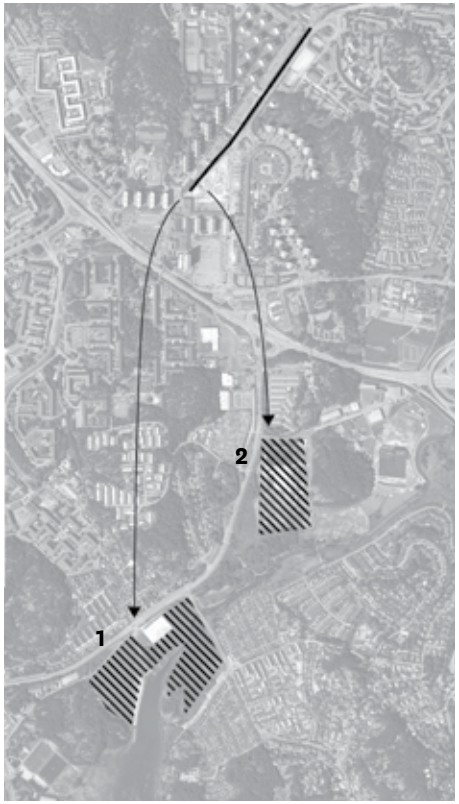
SITE ALTERATION



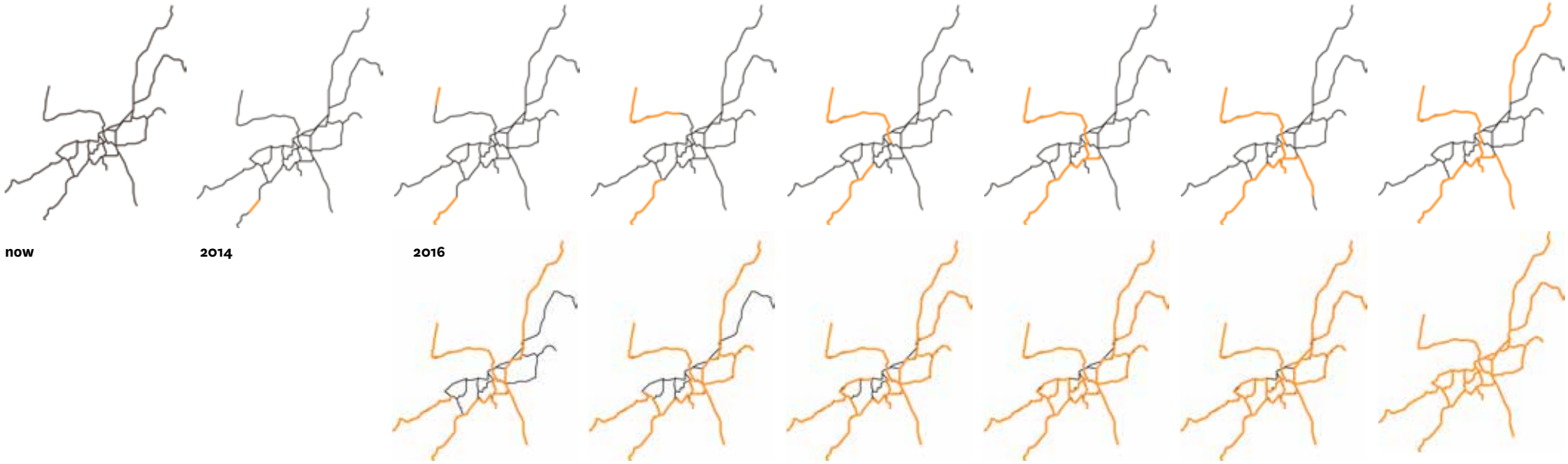




The meadow system need mother meadows in order to spread an existing and site adapted species pool. With the "hay method" hay from the mother meadow is placed on the new meadow site the day of harvest. The seeds drop onto the ground, the hay is taken away and then the meadow species will have a chance to start to grow. In time the tram meadow will be a spreading pool by itself and the hay can be used as fodder. The tram meadow in Frölunda is connected to the cattle grazing the Välen nature area (1) and the Wetland Field (2).

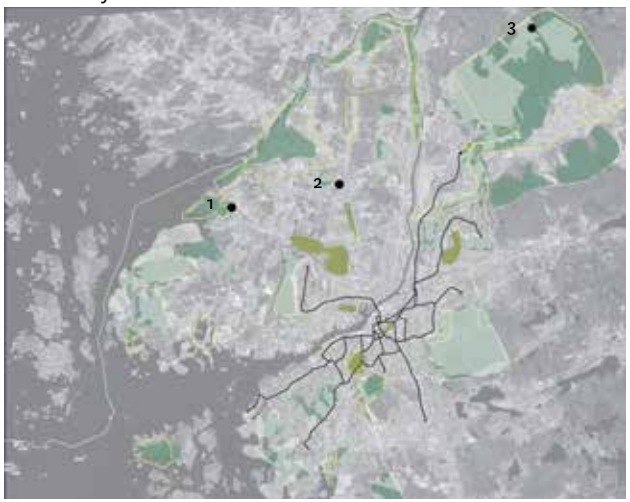


DEVELOPMENT PRINCIPLE FOR THE TRAM MEADOW NETWORK

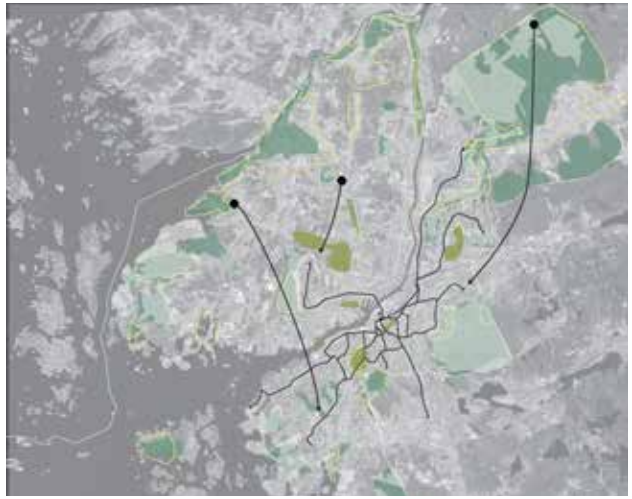


now **2014** **2016** **20.....**

Storegården meadow (1), Skändla meadow (2) and Skarpekärr meadow (3)have rich biodiversity and consistent management, by using the “hay method” these meadows work as mother-meadows for the tram -meadow system.



The biodiversity of Storegården meadow, Skändla meadow and Skarpekärr meadow are enriched by larger patches created by spreading their species and species genes in the continuous tram- meadow system.



EXTENDED SITE NEGOTIATIONS . In order to realized the completed tram meadow system a vast number of actors need to collaborate over time.

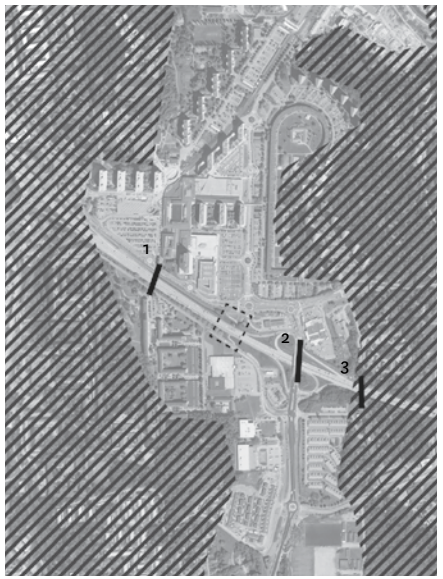
SITE 4 **VÄLEN-FRÖLUNDA PASSAGE**

CONSIDERATIONS

The increased car traffic on the main road system correlate with the big investments being done in the Gothenburg road system. Right now the West Swedish Agreement concern both decreasing inner city centre traffic by congestion charges and building new car bridges and tunnels over Göta Älv.

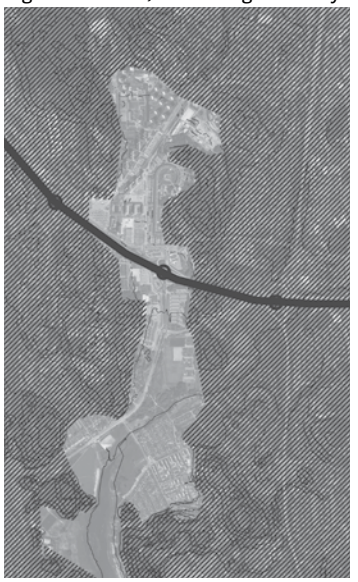
THE POSSIBILITY TO CROSS MAIN ROADS BY FOOT AND BICYCLE IS OF CONCERN.

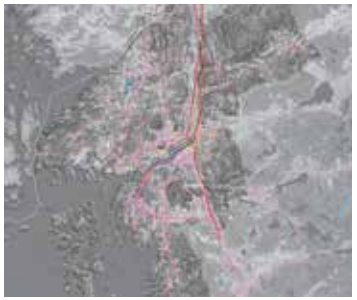
Foot- and cycle ways crossing Västerleden



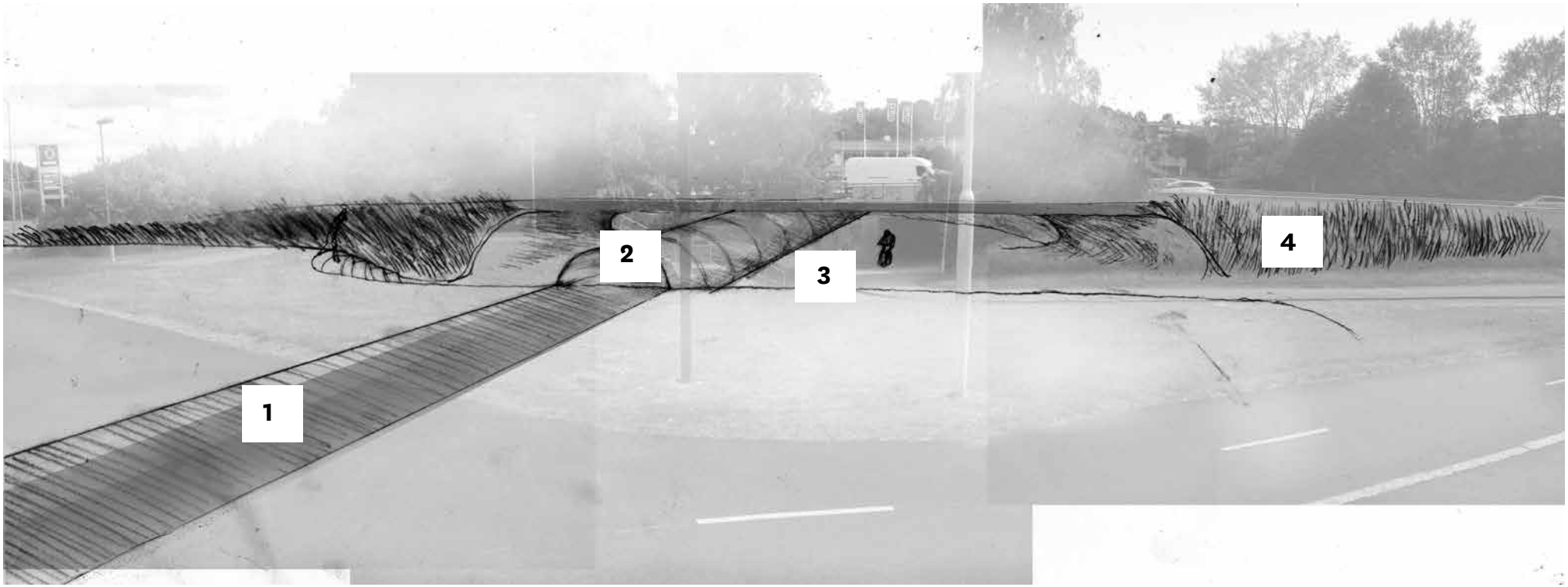
1. Bridge connecting the housing Topasgatan/ Briljantgatan with Frölunda Centre.
2. Nästevägen crossing Västerleden in Frölundamotet
3. Bridge connecting Frölunda church with Toftaåsgatan

Västerleden, a four lane road of regional interest, is crossing the valley





Layer 1: Orthophoto Gothenburg Municipality, Geodataavdelningen (2013) Kartor och geodata, Göteborgs stad. Gothenburg: Gothenburg Municipality
Layer 2: Excepts from Gothenburg primary map,(2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 3: Section-window and site (authors drawing)
Layer 4: Distances, authors drawing



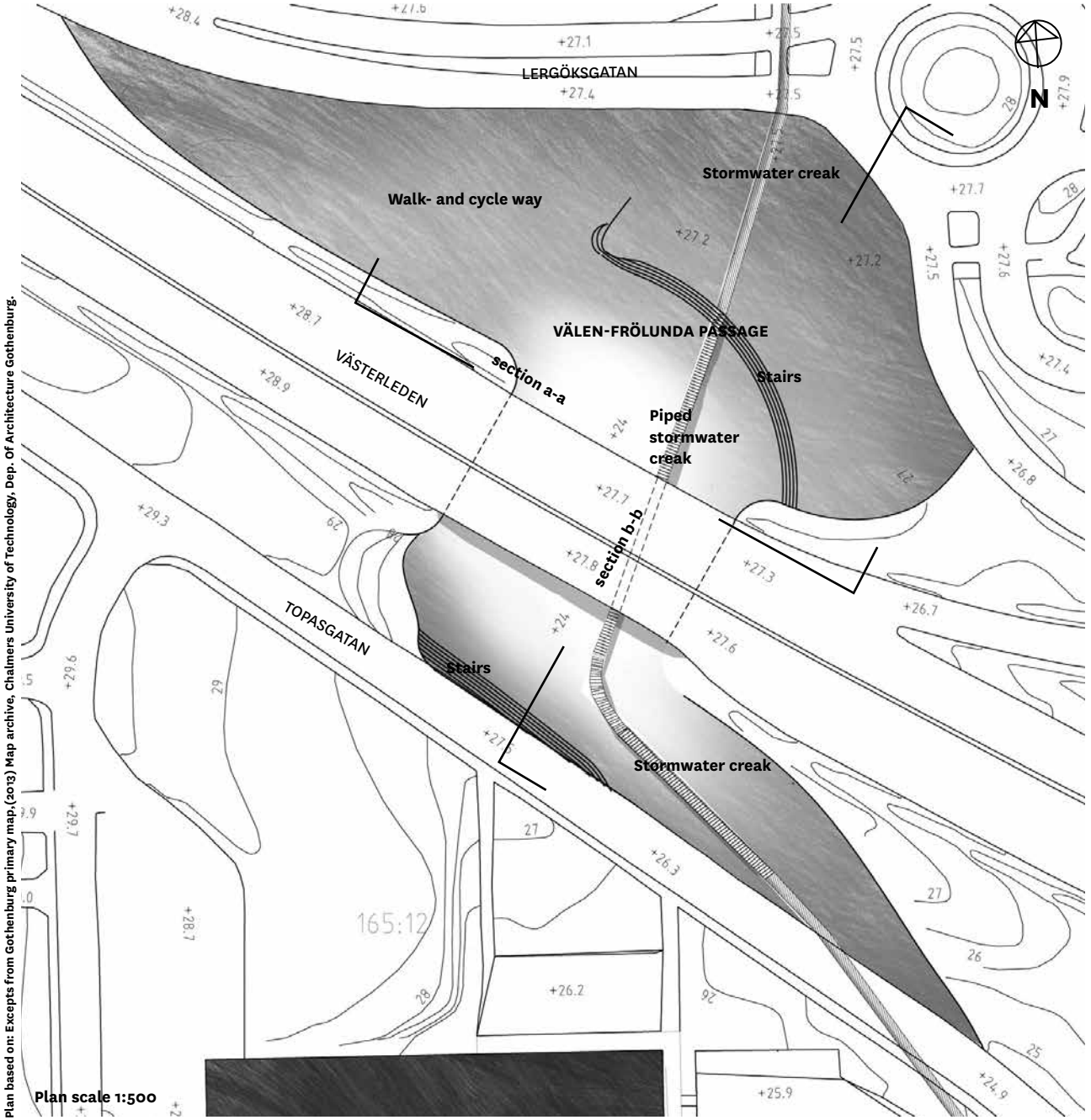
1
The ground stormwater creak continue from the parking lots through out the valley. It is covered with a permeable mesh, to create a continuous walkable, cyclable, and drivable area.

2
To maintain a functional rake for the water flow the stormwater creak is piped through the passage. The piped water enters through the passage and continuos in an open system towards the Wetland field (Site 5).

3
The passage, is a widened tunnel for walking and biking and to lead through the Frölunda-Välen stormwater course.

4
The slopes towards the Västerleden highway is of meadow/grass type and can be transformed into accessible areas: stops for public transport.

PRINCIPLE PLAN



PRINCIPLE STORMWATER COURSE

The Extended underpass is part of a system of creaks that lead and the remediate the water, following the low points in the valley.
The system will be showed in 3 sites, Site 1 Stormwater paring lot, Site 4 the Välen-Frölunda Passage and Site 5 the Wetland Field.

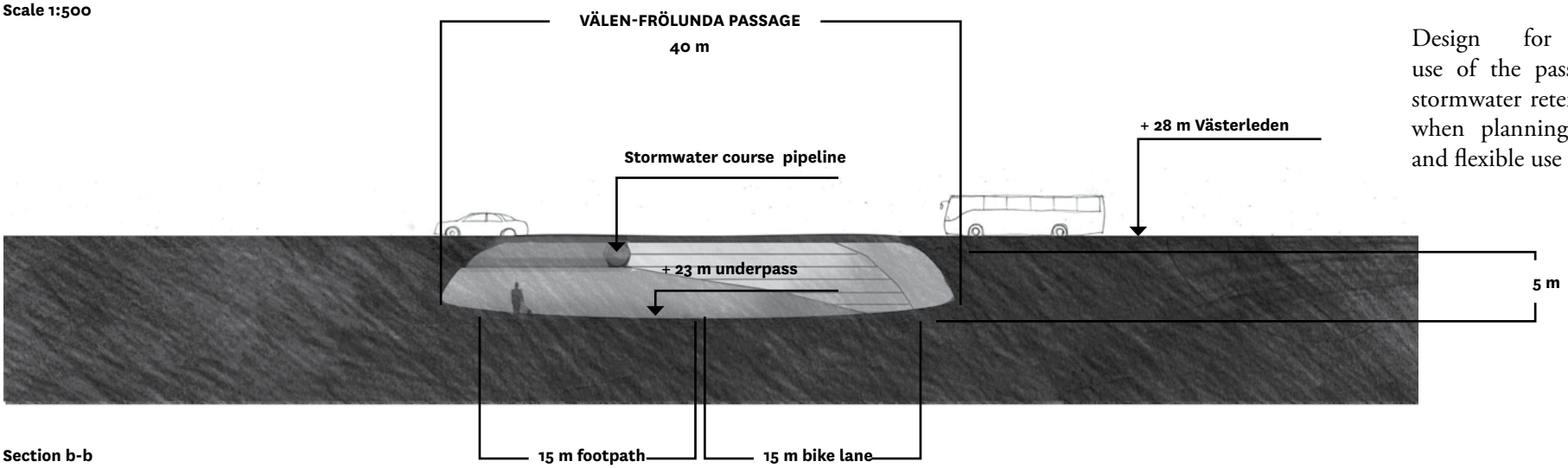
ALTERATION PRINCIPLES

Enhance the walk- and cycle-connection between the Frölunda part of the valley and Välen.

Design for multifunctional use of the passage for example: stormwater retention, biodiversity when planning green structures and flexible use over time.

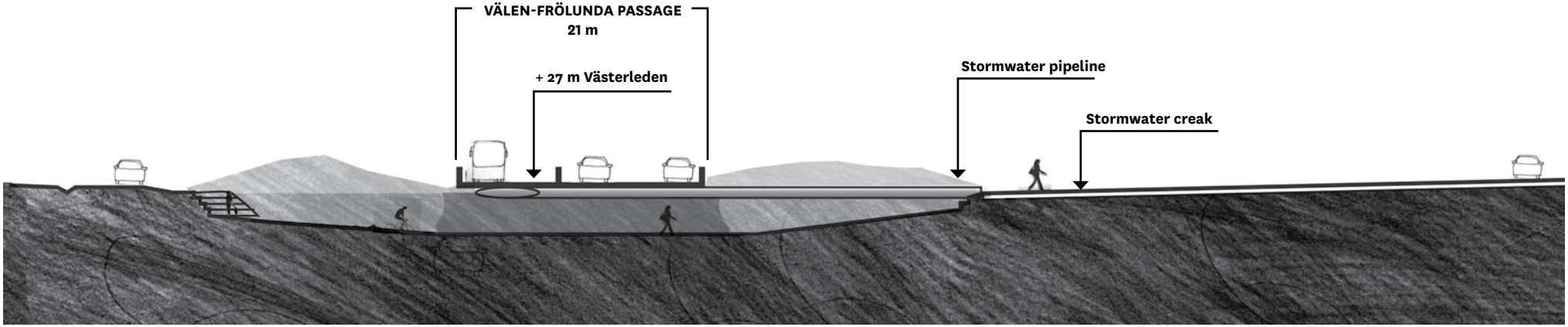
Section a-a

Scale 1:500



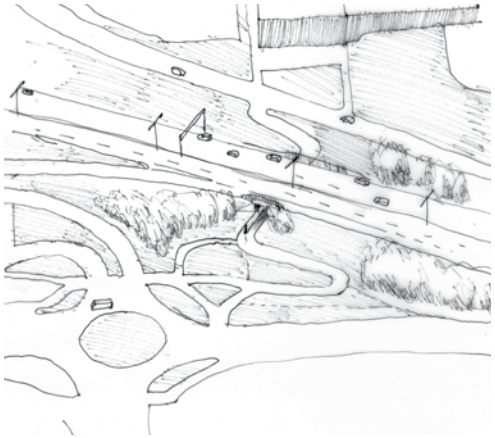
Section b-b

Scale 1:500

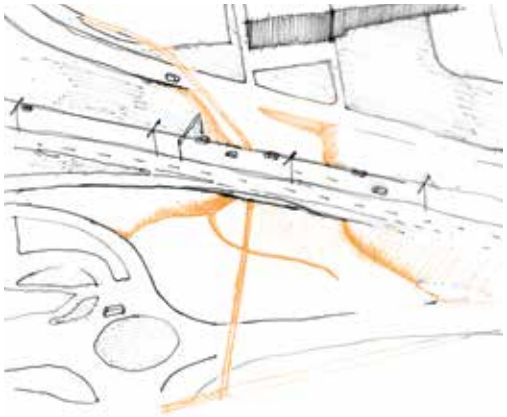


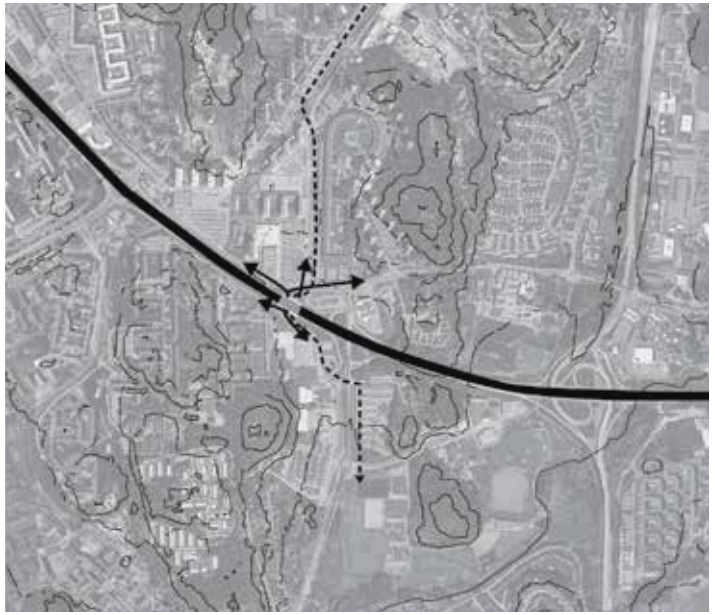
NEGOTIATION

SITE TODAY



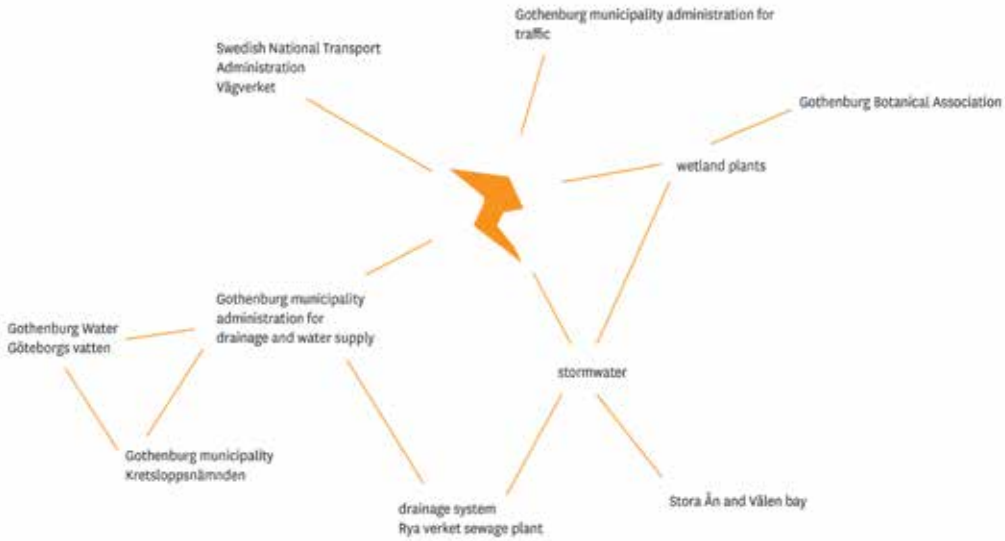
SITE ALTERATION



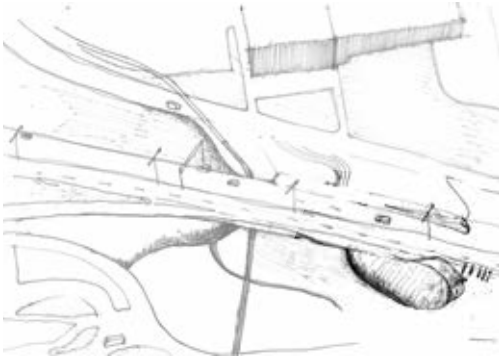


SITE ALTERATION - EXTENDED FOOT- AND CYCLE WAY: The first negotiation concern is to extend the underpass, to make a passage for cyclists, walkers and to lead the Välen-Frölunda storm water course towards the Wetland Field (Site 5)

SITE NEGOTIATION. In order to realize the first alteration a number of actors need to collaborate:

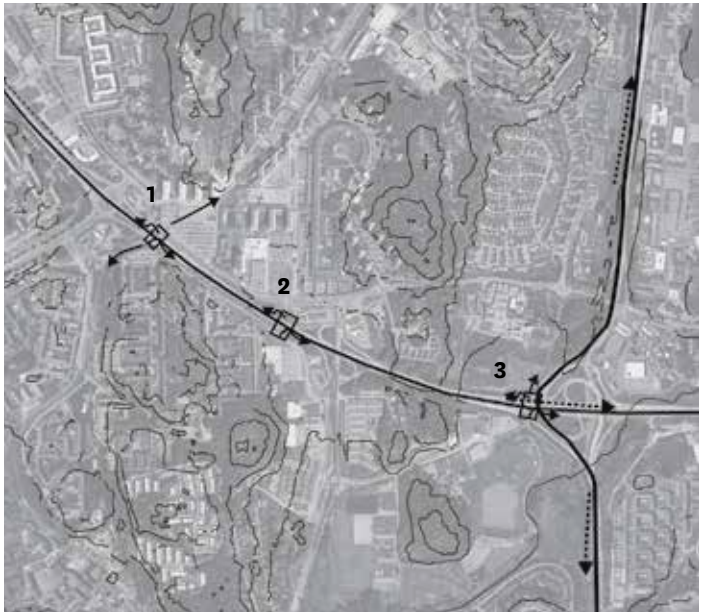


EXTENDED ALTERATION

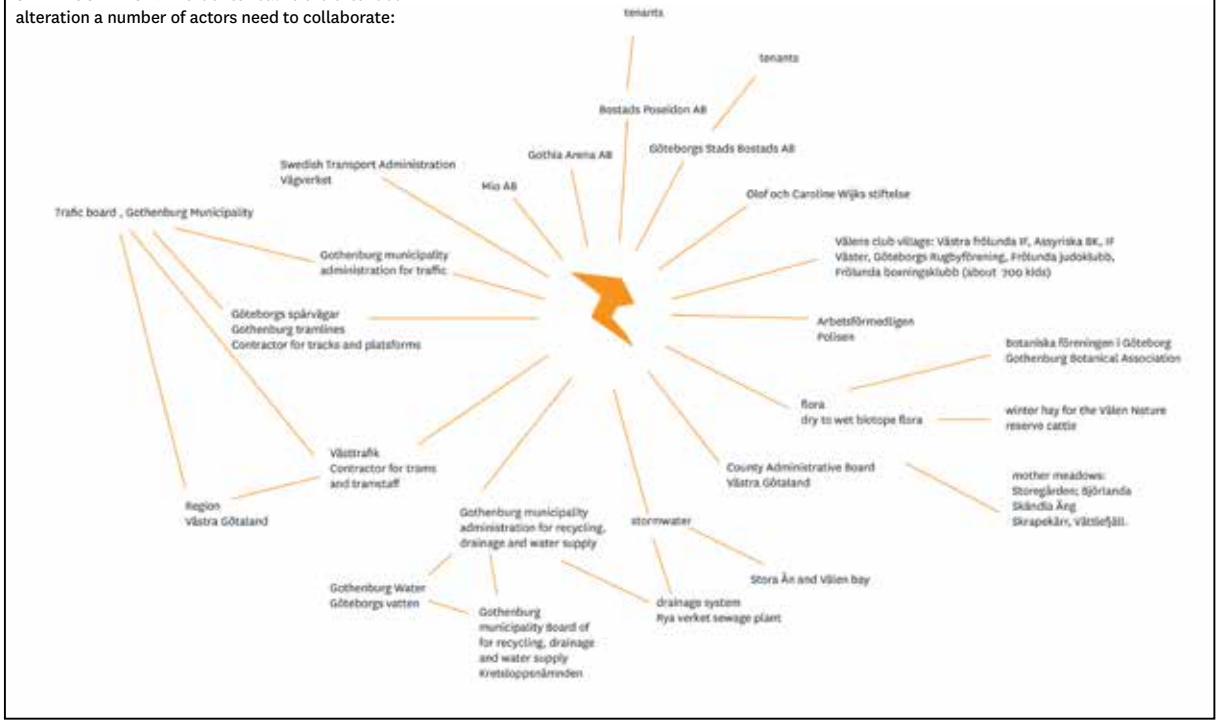


Stop for public transport on Västerleden

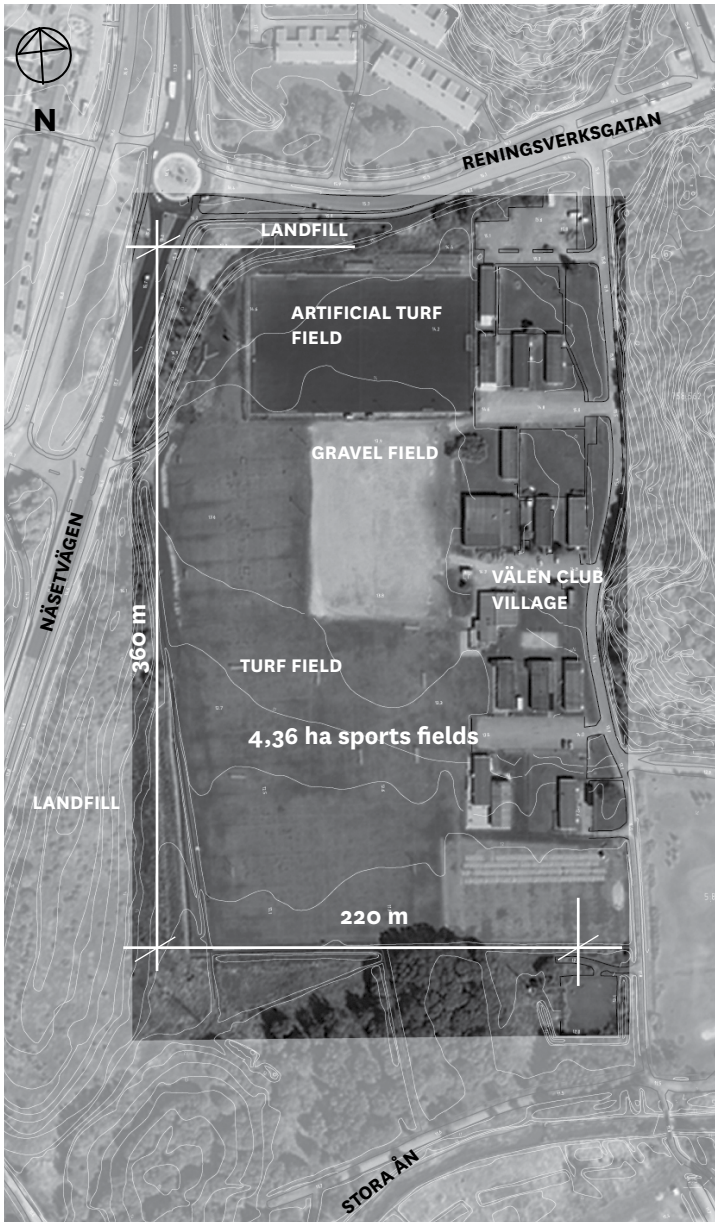
SITE NEGOTIATION - EXTENDED PUBLIC TRANSPORT and
MULTIFUNCTIONAL USE
OF EXISTING ROADS:
When the Västerleden is being transformed into carrying more public transport, tram lines or trolley busses, new stations and stops can be placed according to the map: Connection 1. connecting the existing tramline with the new road line, Connection 2. connecting the southern part of the valley with the road line, Connection 3. connecting Dag Hammarskjöldsleden/Säröleden with the Västerleden road line.



SITE NEGOTIATION. In order to realize the extended alteration a number of actors need to collaborate:



SITE 5 **VÄLEN WETLAND FIELD**

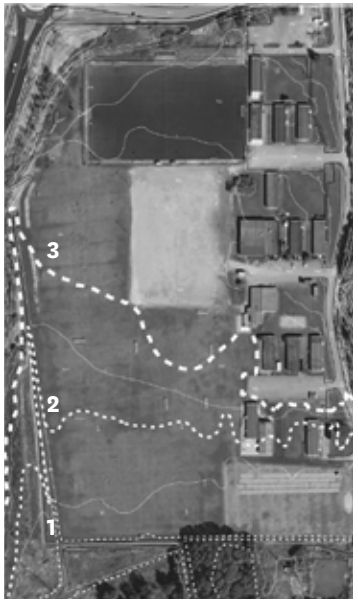


Existing height levels

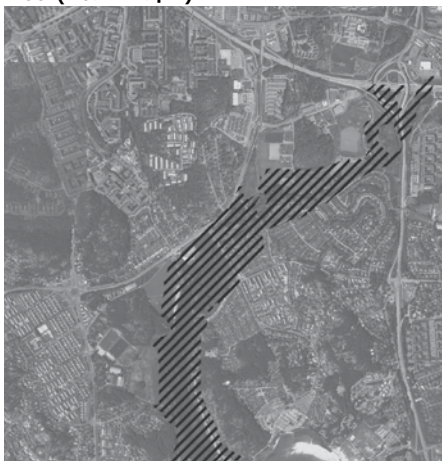
1.+13.5

2. +12.5

3. + 11.5



+ 12.5 m water level, UN IPCC trajectory year 2100 (+ 0.2- + 1.4 m)



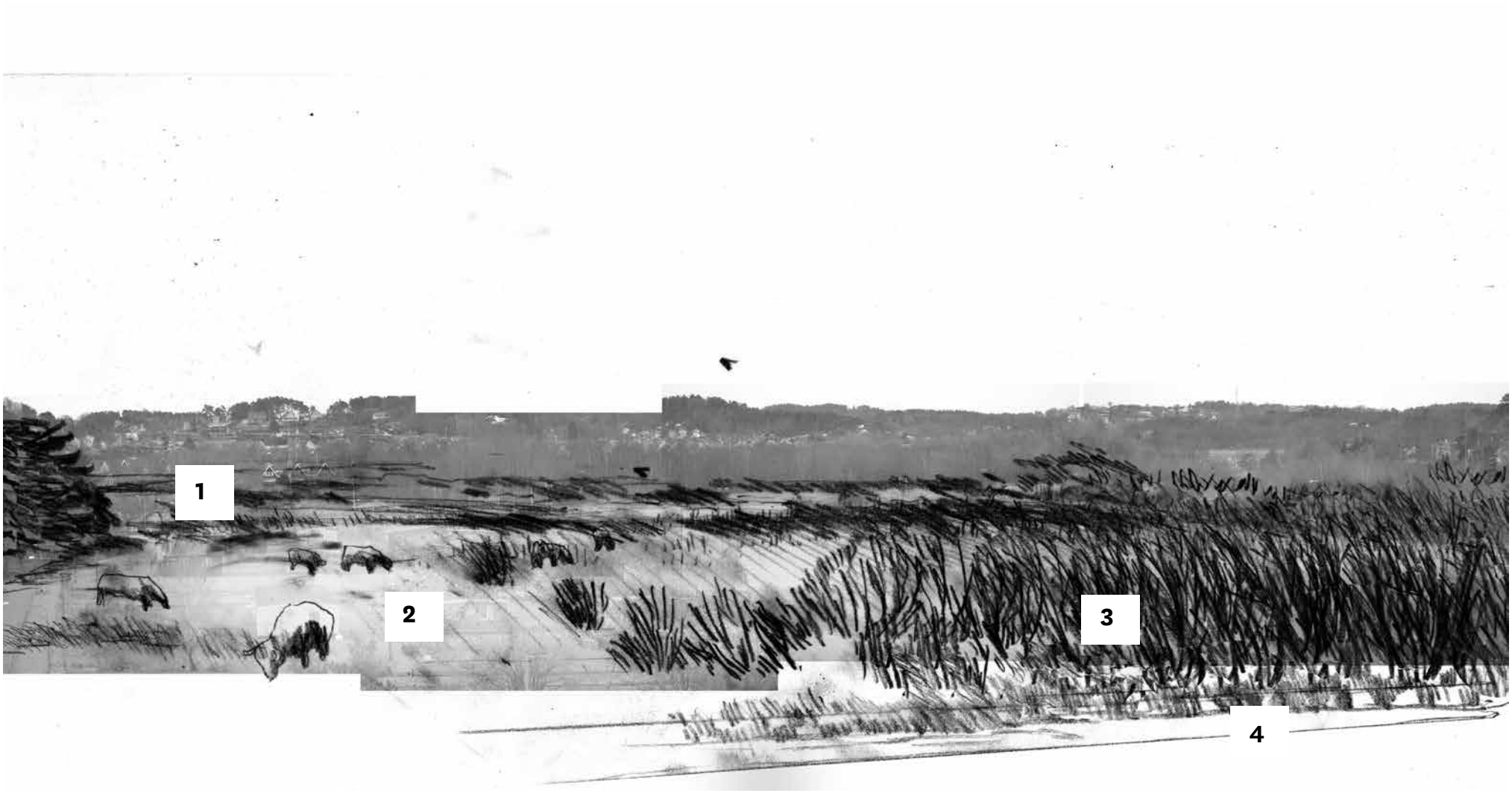
The existing vegetation systems will be changed due to climate change as the water level is rising.

Layer 1: Orthophoto Gothenburg Municipality, Geodataavdelningen (2013) Kartor och geodata, Göteborgs stad. Gothenburg: Gothenburg Municipality
Layer 2: Excepts from Gothenburg primary map,(2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 3: Section-window and site (authors drawing)
Layer 4: Distances, authors drawing

CONSIDERATION

The sea level rise due to climate change will effect the coast line. The biodiversity in the shallow water of Välen, reed belts and Salix shrubs will be effected by the changed water levels. The new coast line will require different actions, even in the small area along the Välen bay and the Stora Ån. To assure future existence of the species richness of the pastures and meadows and the bird habitats, land must be preserved to keep these functions. (Göteborgs Stad, 2011a)

THE CONSIDERATION IS WHERE AND HOW TO PROMOTE BIODIVERSITY ALONG THE NEW COAST LINE.



1
The Wetland area is flexible in size due to the variation of the Stora Ån creak floodings. The wetland area is a bird habitat.

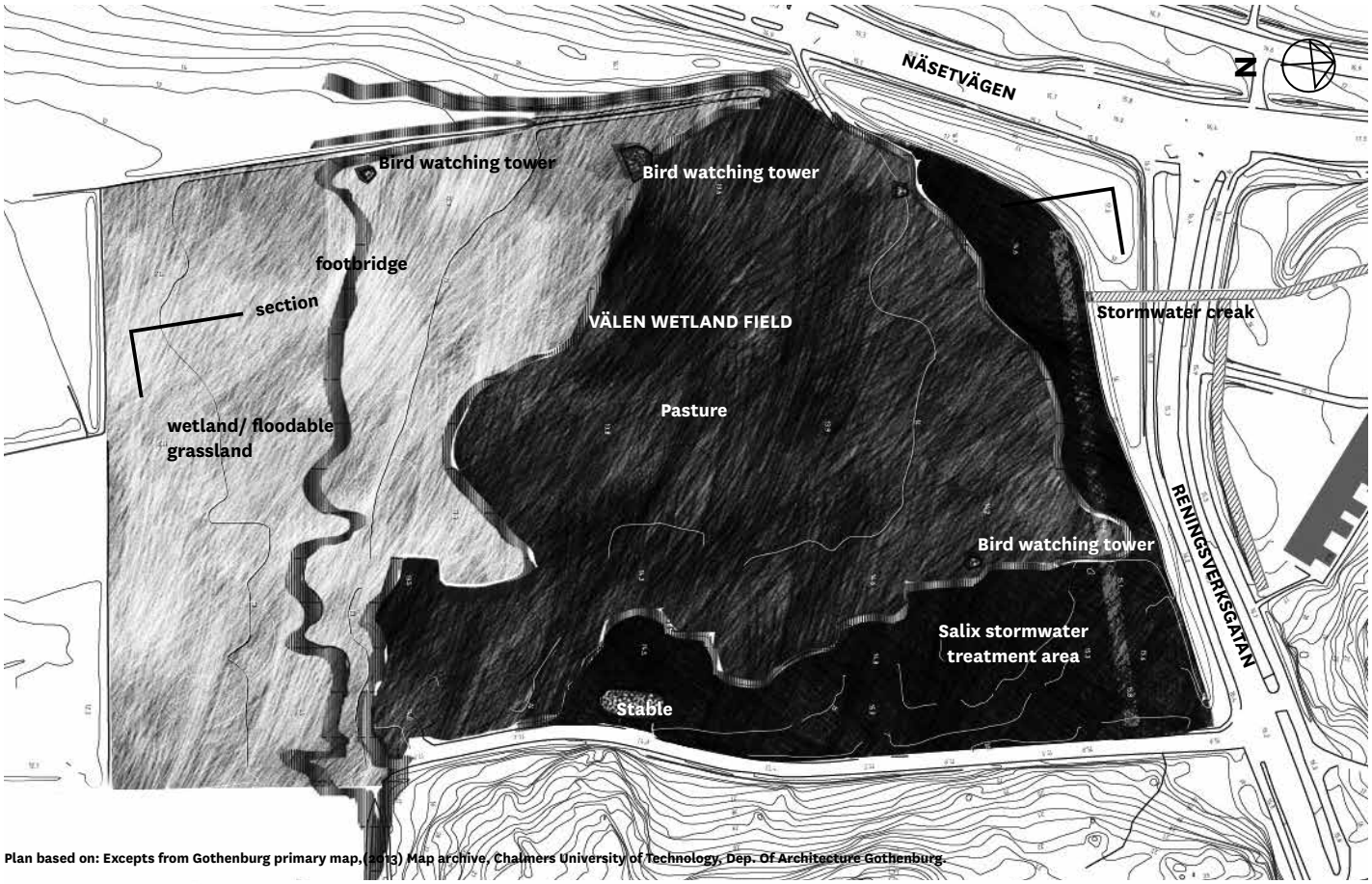
2
As the water levels fluctuate the pasture land will be shrink and grow over the year and over the years. The area is managed by grazing.

3
The Salix storm water retention area. The Salix species are good at remediating pollutions, due to the growth of the Salix the shrubbery can be harvested and becoming biomass, or they will be managed as a bird habitat.

4
The Välen -Frölunda stormwater course is led into the Salix shrubbery in order to flood the area. In this space the plants can uptake pollutants and finally the water can infiltrate. The Salix stormwater treatment area is the final destination of the Välen -Frölunda stormwater course. .

PRINCIPLE PLAN

Scale 1:1000



Plan based on: Excepts from Gothenburg primary map,(2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.

ALTERATION PRINCIPLES

Extend the existing Välen Nature Area biotopes to the football field area.

The biotope design correspond to the management and functional principles of the Välen Nature area. The Välen Wetland Field is a substitute area in order to extend and preserve the biotope of the Välen Nature Area when sea level rise. The biotopes are: floodable wetland (harvest of reeds or grasses due to the need), a pasture and a storm water retention area with Salix shrubbery.

Accessible footbridges position the height of the land - working as pedagogical markers of sea level rise- they are levelled so as to not be flooded themselves.

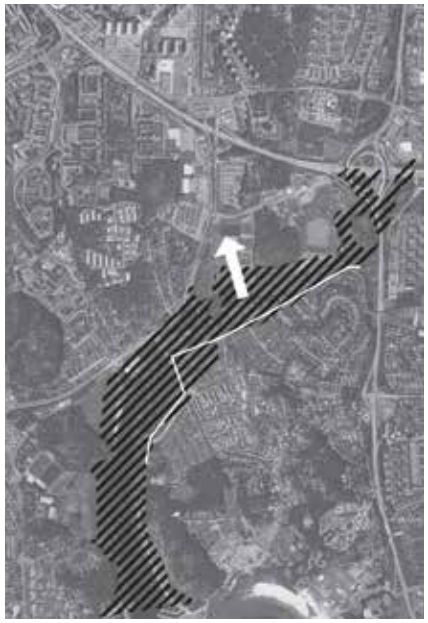
Consider how to use local and sustainable materials for the constructions on the site.

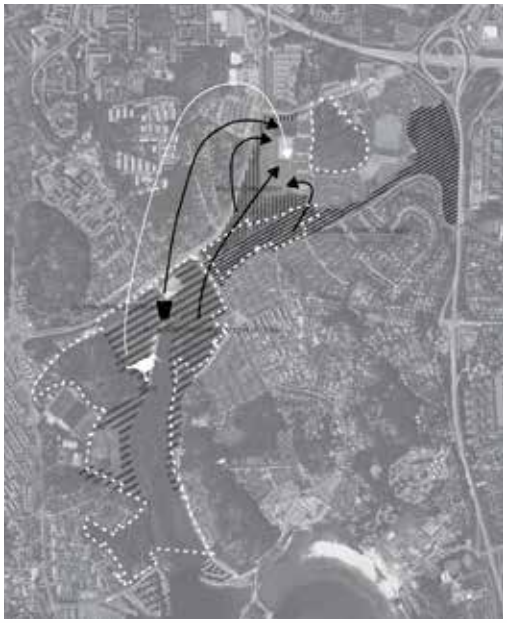
PRINCIPLE SECTION

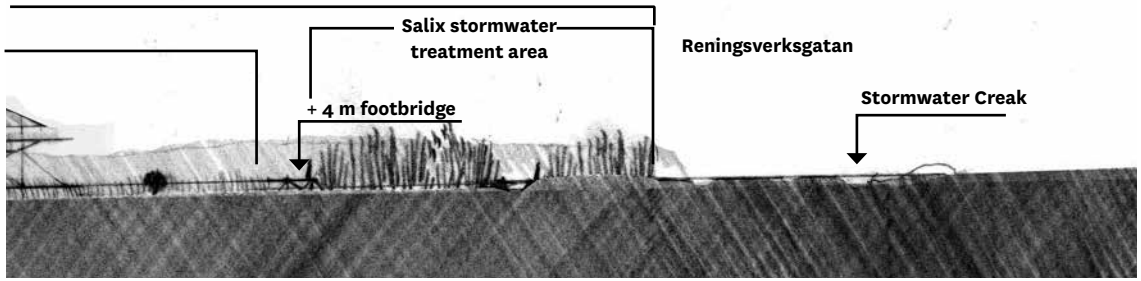
Scale 1:500

The principal strategy for the site is to withdraw, to allow the water to occupy the space

With the withdrawal, the Välen nature area will persist, with its management, but slowly moving north. This will preserved the current species and habitats. The functions of the local storm water retention will also be relocated to the site.







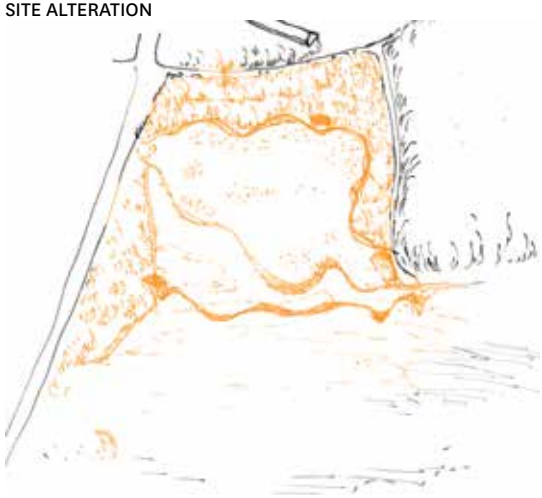
PRINCIPLE STORMWATER COURSE

The Water Front Field is the floodable retention area for the system of grey water creaks and pipes that leads he water, following the low points in the valley, to this end point.
The system have been showed in 3 sites, Site 1 the Stormwater parking lot, Site 4, the Välen-Frölunda Passage and Site 5 the salix stormwater treatment area in the Wetland Field.

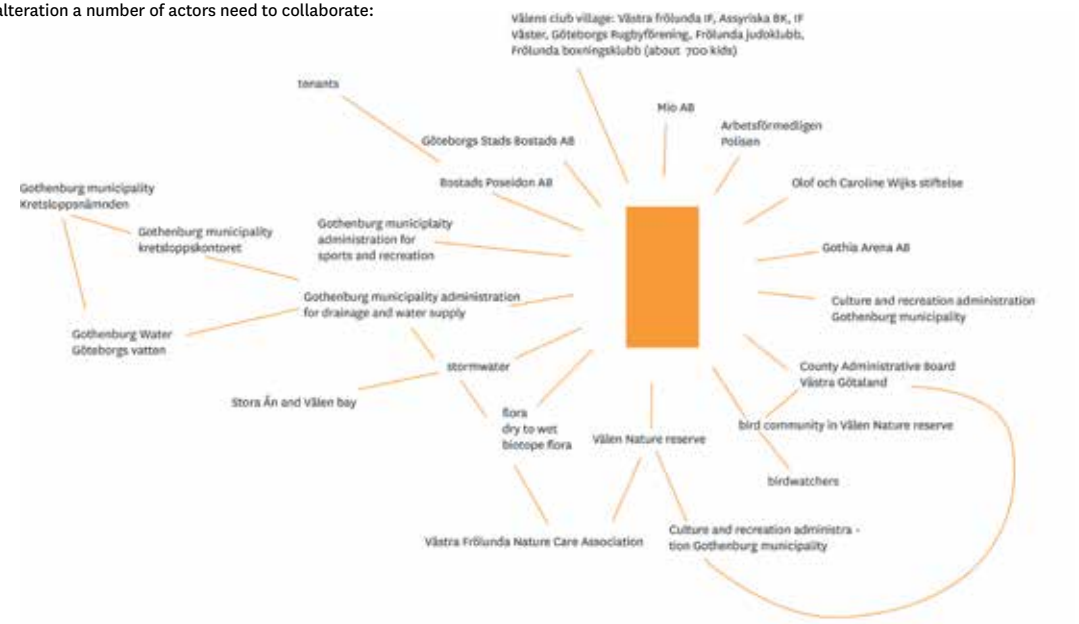
NEGOTIATION

THE SITE TODAY

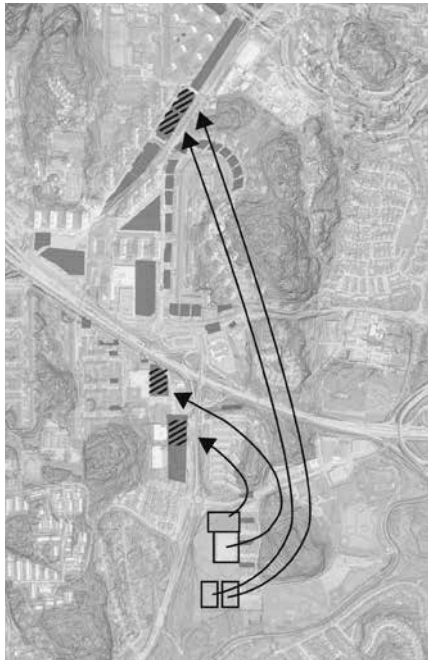
SITE ALTERATION



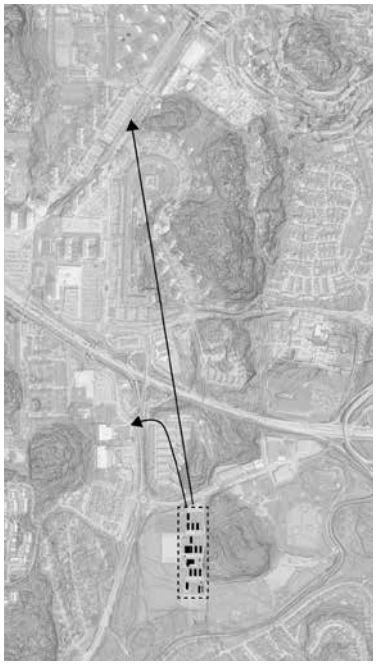
SITE NEGOTIATION. In order to realize the first alteration a number of actors need to collaborate:



The football fields will be relocated to the centre of the valley to retain the spatial openness and to add new functions to the northern valley area



The Vålen club village will be relocated. Houses can be moved as they are barracks or existing garages can be transformed into club houses.

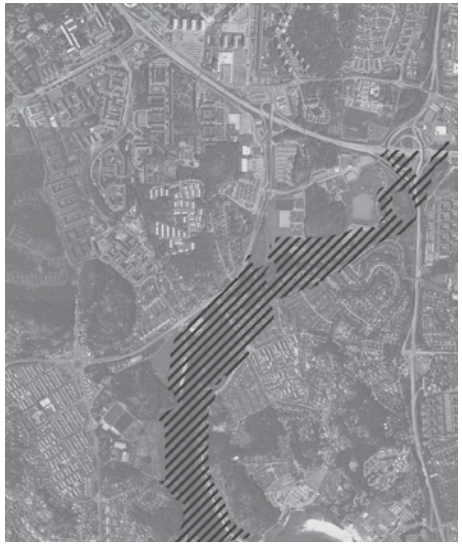


SITE 6 **STORA ÅN -VÄLENVIKEN WATERFRONT DYKE**

Välen Allotment Area
"The lower area" cottage 188-330.
Established 1958
7.27 HA

Existing height levels
1.+13.5
2. +12.5
3. + 11.5

+ 12.5 m water level, UN, IPCC trajectory year 2100 (+ 0.2- + 1.4 m)

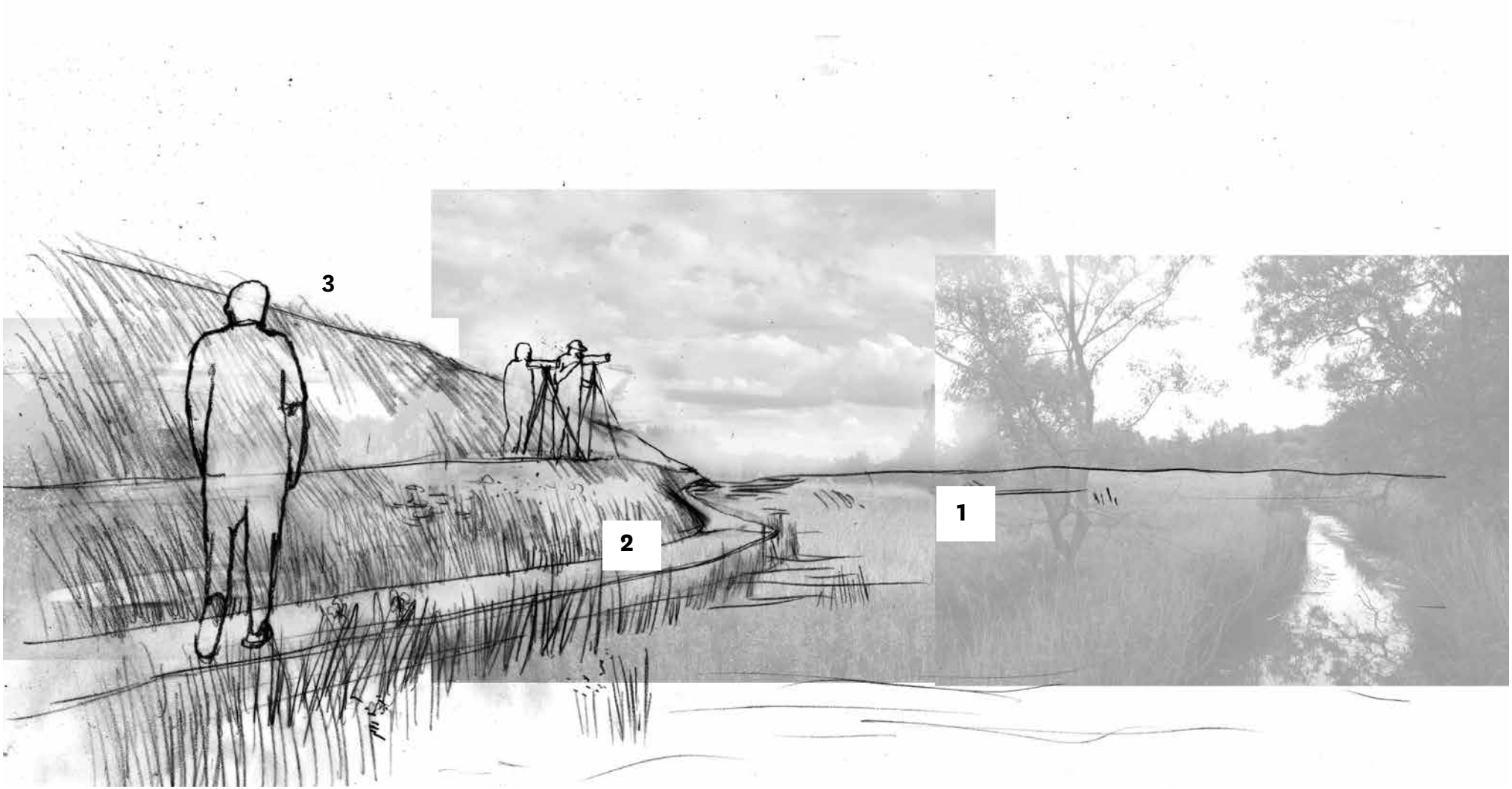


Layer 1: Orthophoto Gothenburg Municipality, Geodataavdelningen (2013) Kartor och geodata, Göteborgs stad. Gothenburg: Gothenburg Municipality
Layer 2: Excepts from Gothenburg primary map,(2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.
Layer 3: Section-window and site (authors drawing)
Layer 4: Distances, authors drawing

CONSIDERATIONS

The sea level rise due to climate change will effect the coast line. The new coast line will require different actions, even in the small area along the Välen bay and the Stora Ån. The Välen Allotment Association with its high cultural values and rich biodiversity values, is situated in low lands close to the creak Stora ån, which will according to sea level rise prognosis be flooded. (Göteborgs Stad, 2011a)

THE CONCERN IS TO PROTECT THE ALLOTMENT AREA FROM FLOODING



1

The area where Stora Ån is situated is low with small height differences. This area will be flooded when sea level rise.

2

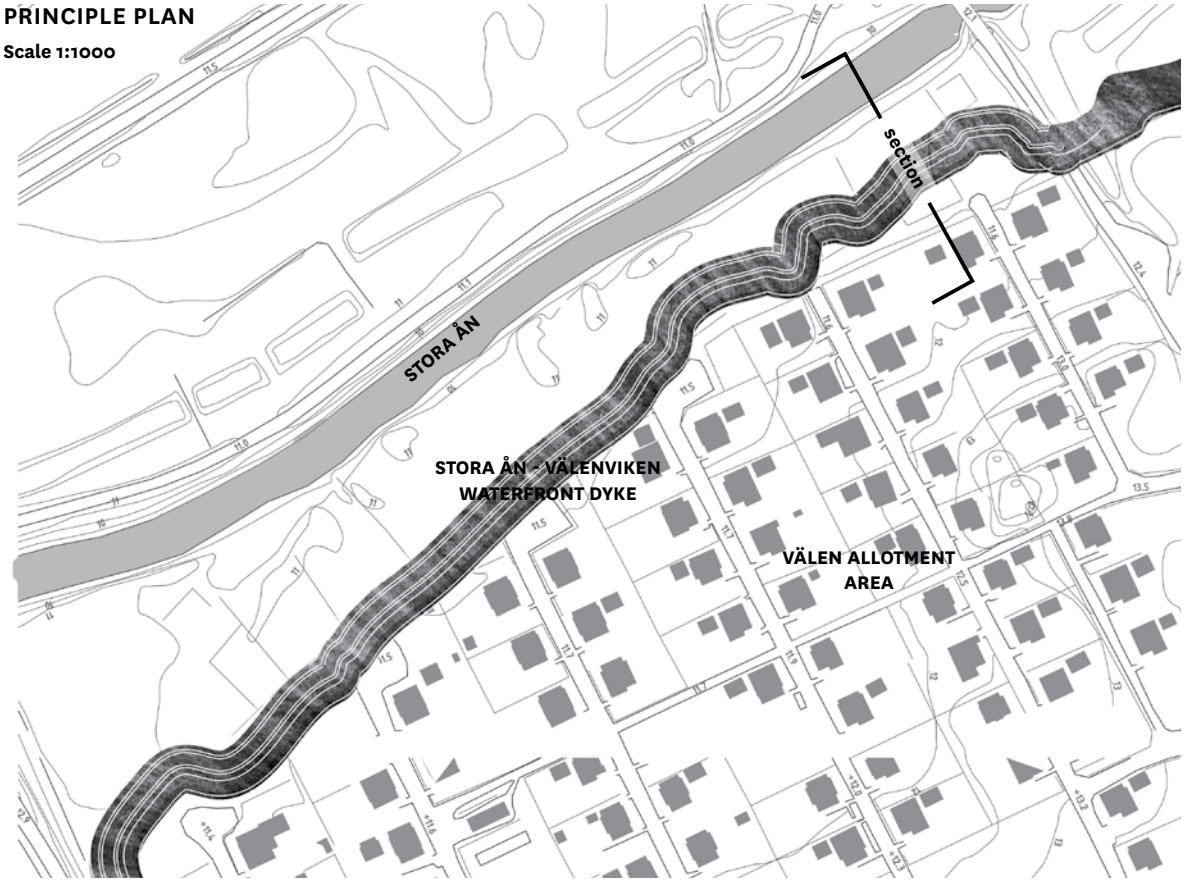
The footpaths mark the different land heights. The lower path marks the level of +1,5 m and the higher +2,5 m, (of the current seal level.). By making the dyke accessible it becomes a continuation of the walkway following the Välen-Frölunda stormwater course - along the Välen dyke down to the sea shore by the bay Askimsviken

3

The 3.5 meter high dyke is covered with a grasses and herbs. The dyke protect the Välen allotment area from flooding.

PRINCIPLE PLAN

Scale 1:1000



Plan based on: Excepts from Gothenburg primary map,(2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.

ALTERATION PRINCIPLES

The dyke should be positioned in order to protect the Välen allotment gardens from flooding.

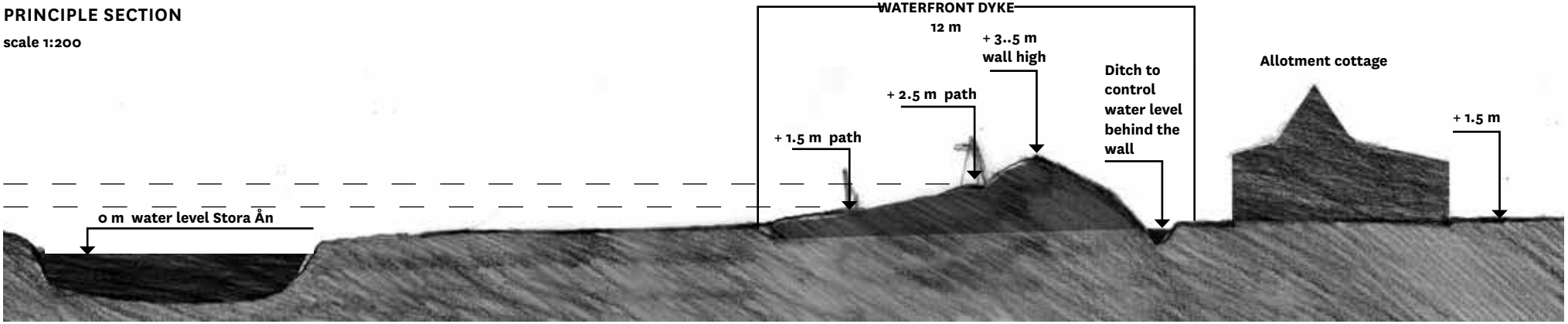
The dyke is designed as an accessible walkway that is connected with existing and new walkways, for example to the stormwater course walkway.

Accessible footbridges position the height of the land - working as pedagogical markers of sea level rise- they are levelled according to the actual heights and can thus be flooded over time.

The pump system to control the water level on back side of the dyke is run by small windmills positioned by the shore.

PRINCIPLE SECTION

scale 1:200

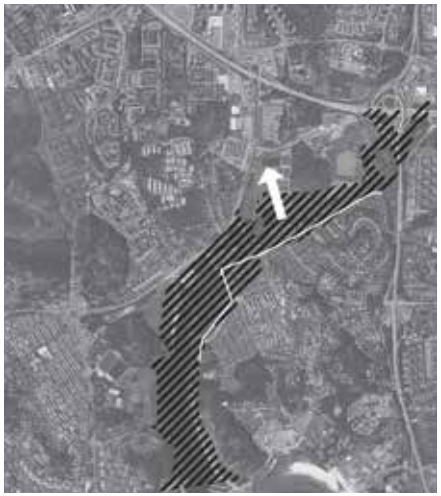


SITE TODAY

SITE ALTERATION

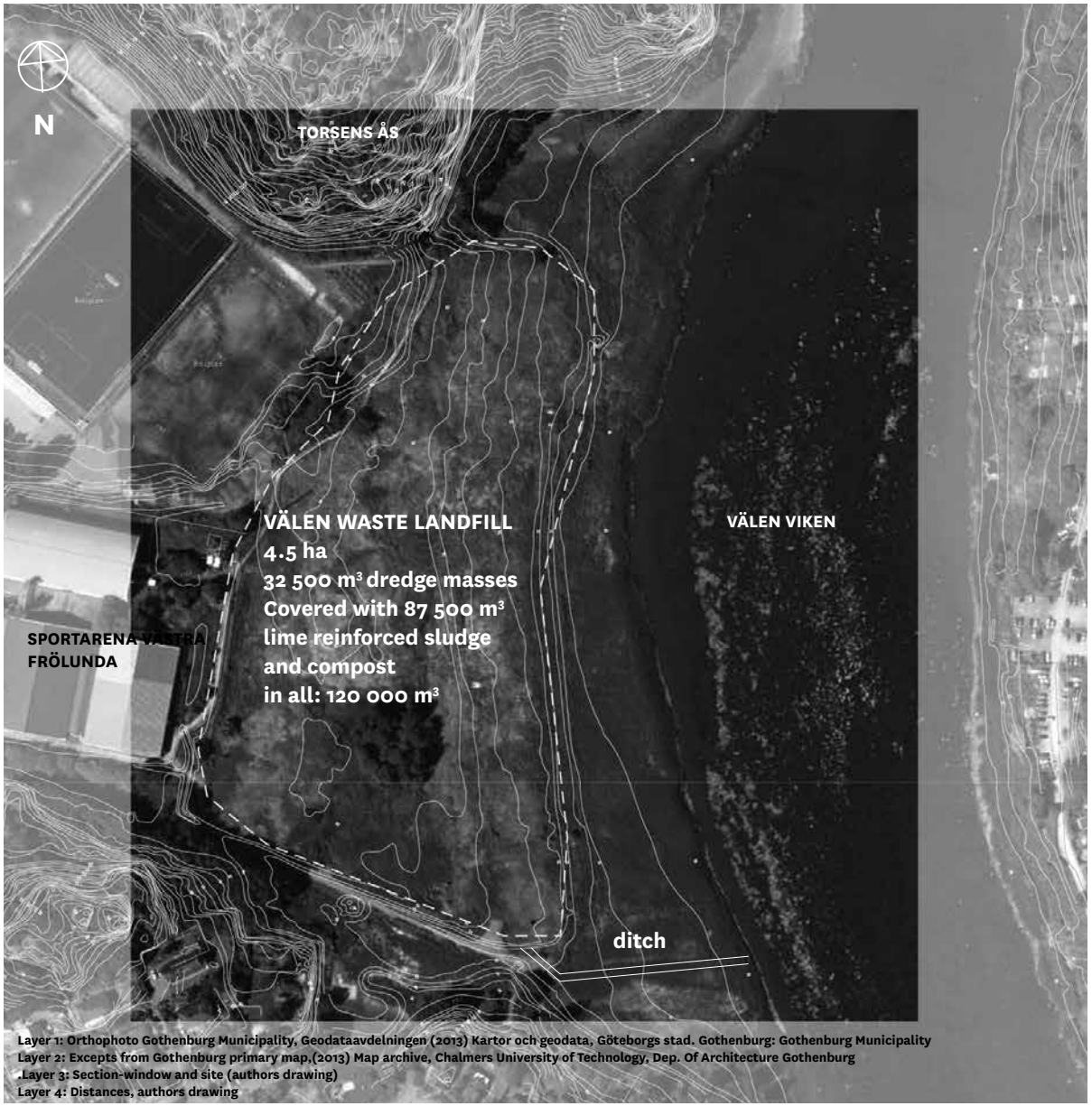
SITE NEGOTIATION. In order to realize the first alteration a number of actors need to collaborate:

The principal strategy for the site is to protect the allotment area from flooding.



Principal stretch of the dyke, 1. Electricity to the pump system and the community are generated with windmills, 2,

SITE 7 **VÄLEN LANDFILL FORUM**



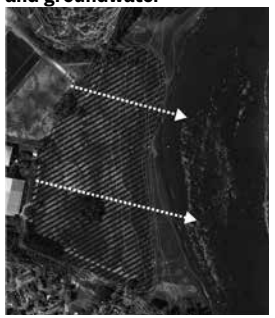
Layer 1: Orthophoto Gothenburg Municipality, Geodataavdelningen (2013) Kartor och geodata, Göteborgs stad. Gothenburg: Gothenburg Municipality
Layer 2: Excepts from Gothenburg primary map,(2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg
.Layer 3: Section-window and site (authors drawing)
Layer 4: Distances, authors drawing

CONSIDERATIONS

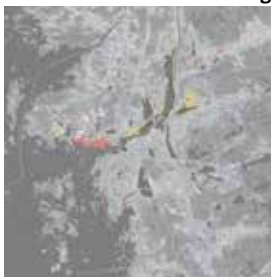
The reports on the status of the Välen landfill, show that the extremely high leachate of quicksilver (Hg), methyl quicksilver, nitrogen (N) and phosphorus (P), exceed the Gothenburg city directory. This fact demands actions already today. With the future prognosis of increased precipitation leachate, pollution of groundwater and polluted surface water, is an even greater risk. The sea level rise and the risk of landslide has not yet been considered, as the pollution problem is urgent. Considering the amount of waste landfills situated close to the coast the Välen deposit can act as a test site.

THE CONCERN IS TO PROTECT THE RECIPIENT VÄLEN FROM FURTHER CONTAMINATION.

Contaminated leachate to Välen form surface water and groundwater

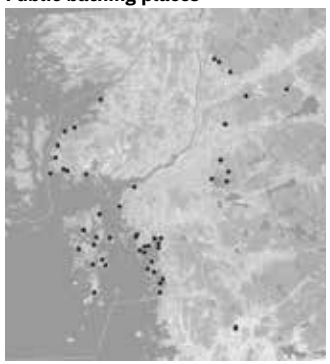


Polluted soil, landfills and waste landfills in Gothenburg



National interest for fishery

Public bathing places



+ 12.5 m water level, UN IPCC trajectory year 2100 (+ 0.2- + 1.4 m)

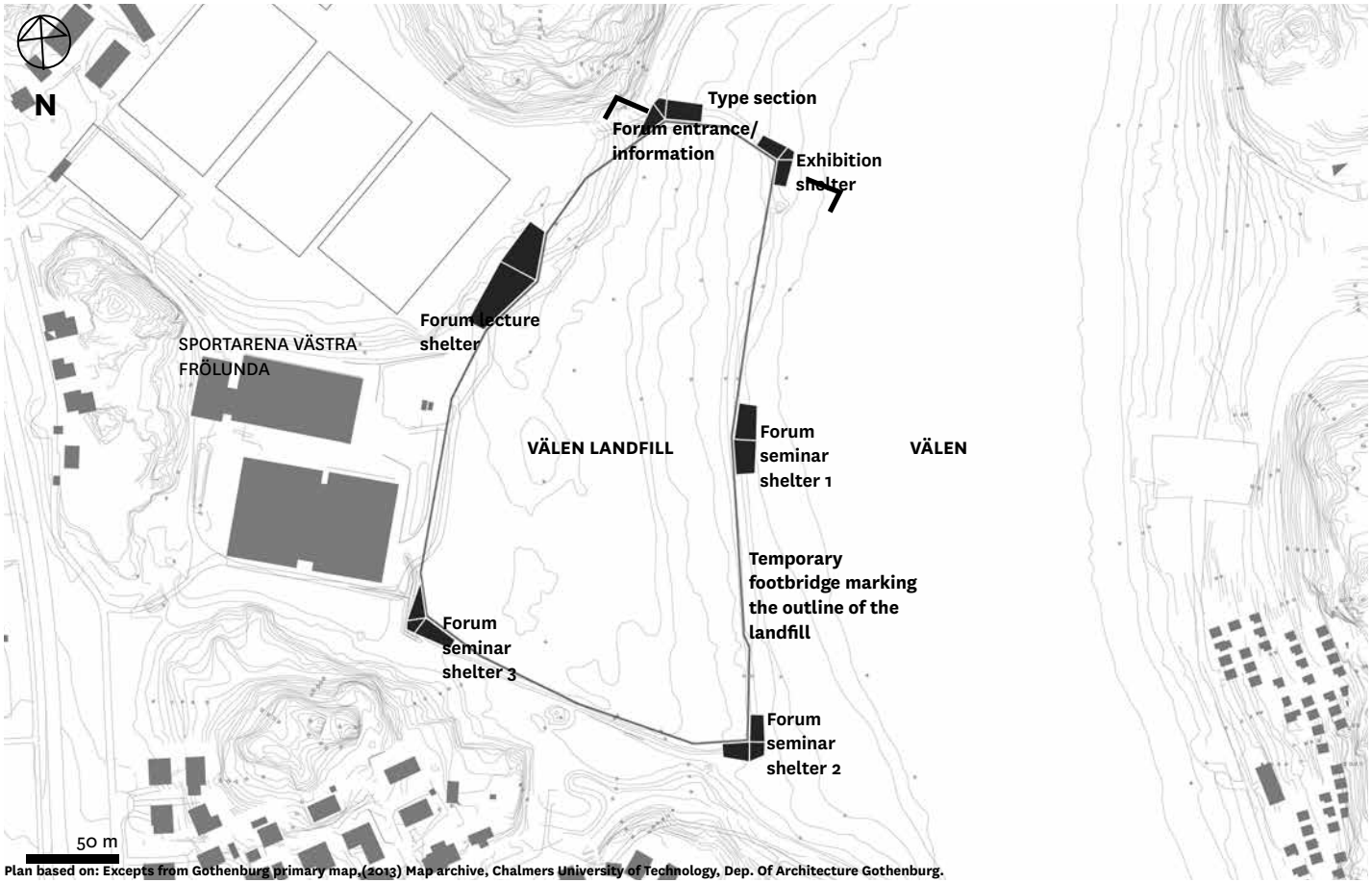
Critical points with sea level rise, + 11,5, + 12,5, + 13, 5 m

1

Välen Landfill Forum conference is a temporary installation by the site while holding a conference on landfill issues.

2

A footbridge following the outer line of the landfill is marking the area, and connecting the Forum conference shelters.



Plan based on: Excepts from Gothenburg primary map,(2013) Map archive, Chalmers University of Technology, Dep. Of Architecture Gothenburg.

ALTERATION PRINCIPLES

Arrange a conference on landfill and soil pollution issues by the Välen Landfill. On the conference experts, municipal officers, and the public is invited to contribute with knowledge.

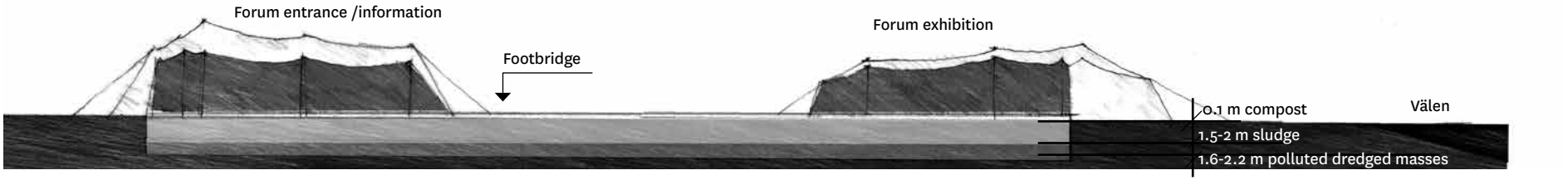
As the landfill area is polluted, no constructions are allowed. The Forum is hosted in temporary shelters just outside of the area.

A footbridge is designed to link the shelters to each other and at the same time these bridges mark the deposit area.

Consider as low material use as possible during the conference.

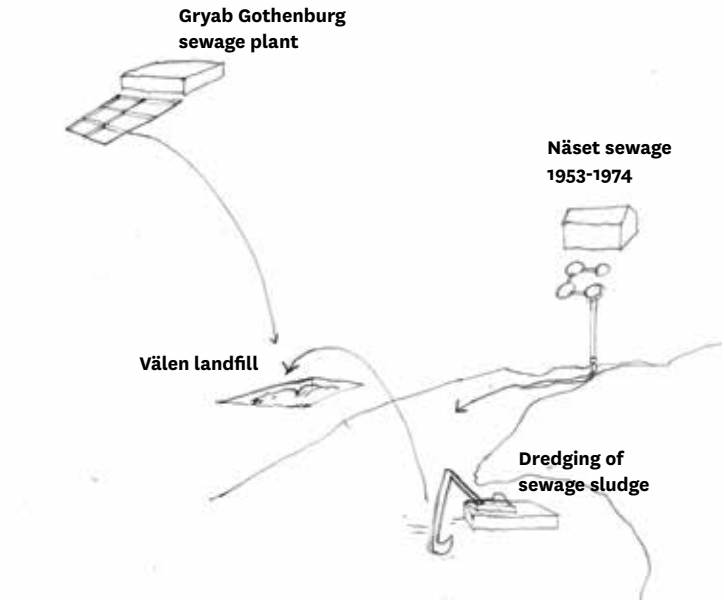
PRINCIPLE SECTION

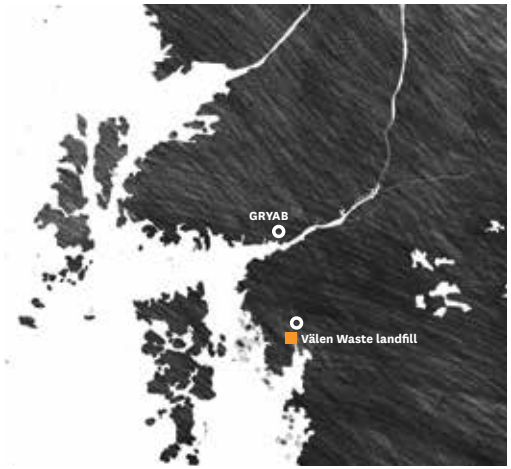
scale 1:200



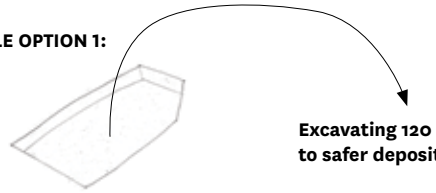
NEGOTIATION

THE LANDFILL TODAY





POSSIBLE OPTION 1:



Excavating 120 000 m³ to safer deposit site

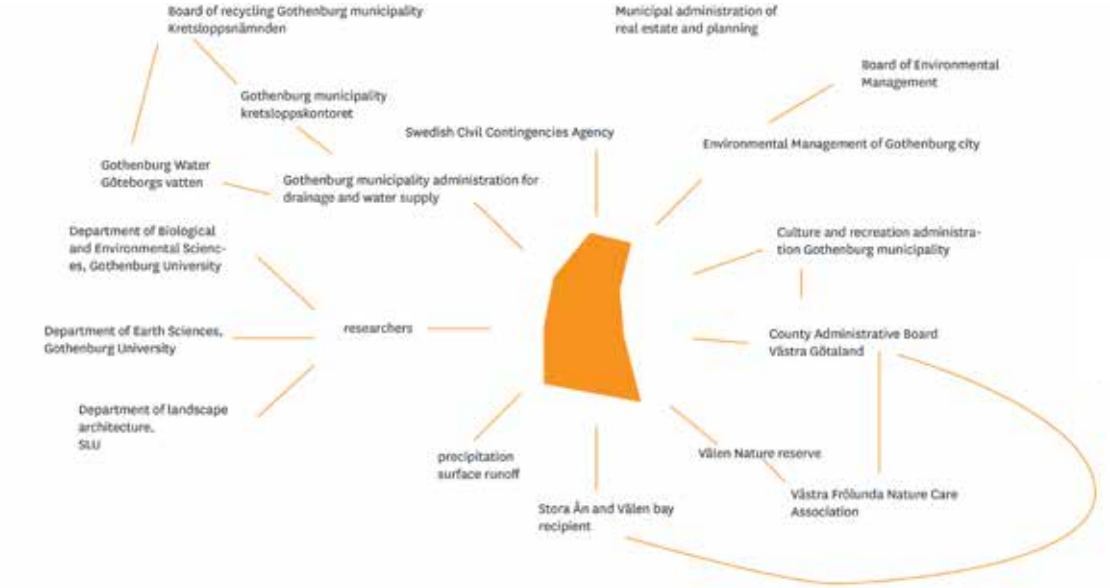
POSSIBLE OPTION 2:

Sealing deposit site

SUGGESTED FIRST ALTERATION:

Forum on landfills/ polluted soils.
As the issue of landfills and polluted soils are very complex a conference on the issue is suggested where the Vålen Landfill is used as conference site and exemple site.

SITE NEGOTIATION. In order to realize the first alteration a number of actors need to collaborate:



3 REFLECTION

The purpose of this thesis is to clarify the understanding of resilience and to test this understanding in a design. This discussion will in accordance with the two main parts, the theory and the case study, first be reflected on separately. The discussion starts with the case study and how the design is conducted and in what direction it could be developed. Further material and method of both the case study part and the theory part will be reflected on. Finally the thesis as a whole is discussed through the lens of what in resilience have been used and how the insights from the work can be useful in future practice.

3.1 REFLECTIONS ON THE TEST DESIGN

When working with the method of site interpretations on a fragment of urban landscape that is also a fragmented urban landscape (through issues and concerns) the alterations suggested can be compared with Sieverts's discussion on improving the same. For Sieverts the fragmented urban landscapes, can be improved by developing new cultural landscapes – from the local current cultural landscape itself. Likewise, all of the alteration principles are made out of a landscape perspective – not a perspective of urban densification trends[13] (although taking them into account)– and since landscapes are cultural artefacts (disregarding any culture-nature divides) the alterations are also new cultural landscapes. Accordingly, what both Sieverts and Farsø propose, with different arguments, is that the demands of the new urban include a whole new dynamic order. That perspective has been tried in this test design in the type of landscape they suggest – a fragmented urban landscape (Sieverts, 2008) and (sub)urbanism (Farsø, 2010). It has thus been encouraging to work in this type of landscape, where the aesthetics and the principles were possible to develop – from the sites themselves and from the scales and domains connected to them.

The test design is presented as a linear narrative. But the work itself has been the opposite. The sites' issues and concerns have been developed parallel with each other and many times issues and concerns overlap the sites, being major concerns for the area and the region or of national interest. Even the part of the site interpretation where sections, plans and photos are used has been an on-going selection of information, an iterative process of getting to know the site. The linearity in the presentation is then loosened up in the alteration part, where analysis maps are reorganized, reused and put together in a new combination, making the alterations affect not only the site itself but numerous people/organizations/actors and sites into a new re-connectedness. The alterations can be viewed as hypotheses that help to understand the social structures linked to the alterations and to the actors involved (both human and non-human). By crossing existing sectors and functions possible actors and new collaborators appeared, a method that gives means to a discussion on negotiation and responsibility.

The method in the test design has its limits. In the case of *Site 1 Mandolingatan parking lot* the concern was the issue of flooding due to heavy rains and the problem with stormwater polluting the ground water.[14] The Mandolingatan parking lot is one of many examples of sealed surfaces in the area and in urban areas at large. This fact made the alteration suggest open stormwater courses together with possibilities for a more free movement over the area by opening up the lot towards the tramline and making Mandolingatan a shared space. If the Mandolingatan parking lot was altered as a solitary fragment people's access to, from and across the site would be a large change, but the impact of handling

13. The Swedish term "blandstad" (in English "mixed city") is one example of a frequently used concept when planning densification projects. Housing and commercial establishments are the main parts of the ideal inner city – the medieval city acting as reference. This concept is used when planning for Backaplan, Lundby, Gamlestaden, Älvstaden and other areas in Gothenburg. See online at: http://www.gothenburg.se, search word "blandstad" [2013-08-14] and at Arkus: http://www.arkus.se/manadens-tanke/blandstad--for-vem/ [2013-08-14].

14. Gothenburg and Västra Frölunda suffered from flooding as recently as May 21st and July 27th this year due to long-lasting but sudden thundershowers (Kenedy, 2013; Svensson 2013).

stormwater would be small, if the site were not connected to a larger open storm water system and a retention area since the clay soils in the area are slow in draining rainwater, making the area rely on the underground drainage systems and pipes. The scale dealt with has so far been a local one, engaging the Välen-Frölunda valley. The system is not mono-functional but is holding issues of both climate change and the use of public space as the new watercourse potentially could be designed according to the alteration principles at Mandolingatan, thus becoming a walkway for public use. The sketch could therefore be a starting point for detailed design where technical calibration towards future precipitation and spatial arrangement together with landowners can be given room – aspects that are shown in the Negotiation diagram.

Site 2 Mandolingatan stormwater cisterns are an example of a modular system that collects rooftop stormwater. Each roof has its own set of cisterns that collect water separately, which can be harvested locally. The big issue is, however, to prevent mixing clean rooftop water with polluted stormwater on the ground into the sewage system, preventing the local clean water resources from coping with periods of drought. The issue of collecting clean water will have an impact on very small sites by building cisterns as suggested, but to gain advantages for the society a change in the municipal detailed plan (zoning plan) could be a solution. The conditions of the site would then preferably result in various ways of collecting or using rooftop water. The sketched cisterns – like large accordions that grow and shrink due to precipitation and harvest – are pedagogic instruments as they visualize the water resources available, where hidden pipes or underground cisterns would hide that effect. Detailed designs of cisterns can be done without commission, but site-specific design in collaboration with the users and managers would make a design more sustainable.

The method of scaling up and down, locating biotopes and the history of vegetation in the area was especially useful in the alteration on *Site 3 Tramline meadow*, together with understanding the development of the tramline system. Here occurred a local possibility of increasing biodiversity and transforming a fenced tramline into an overall network of a biodiverse public space. The alteration calls for the issue of how to handle public space when areas are densified, but it also relates to the issue of concern for *Site 4 Välen-Frölunda passage* – how to handle local and regional traffic when the linear connections between areas become barriers while also functioning as links between the rural or suburban areas and the city centre, or between cities. The suggestion of creating a new functional layer of the tramline that could carry the threatened meadow biotope awoke the interest for possible future uses of other infrastructures such as big regional roads. Is it possible for linear networks to also function as nodes? When dealing with infrastructure and traffic many stakeholders are involved which makes any alteration quite a costly enterprise as traffic needs to stop or be reorganized over time, itself an organizational project. Even presumably small alterations such as the *Välen-Frölunda passage,* where an existing underpass is widened and room is made for the local stormwater course, engage the national traffic board as the specific road is of regional interest. The alteration itself gains impact mainly as it triggers the question of how to handle road systems, vehicle landscapes, on a human scale but also on the landscape scale, in this case reconnecting the Välen-Frölunda valley; together with the idea of integrating new public transports on the big roads with the hope of thereby decreasing single car traffic. Where to position new stops for public transport along the highway and how to treat the buffer zones alongside it and how to connect to the local sites are further questions.

Site 5 Wetland field is incorporating the huge issue of sea water level rise due to climate change. What to defend and when to retire become ethics and politics as there are always values to protect. The Välen nature area is predicted to lie under water within a hundred years. Today it is the most species-rich of the areas in the valley; therefore the plans today are to make the area a nature reserve. The value of today's recreational spaces is not possible to calculate: the Välen football field, the club members, the hours of voluntary work put into the sports activities, the matches arranged. Despite this, something needs to move away in order for something else to take place. In the alteration, the judgement made was that the

football field would be a more flexible organization and spatial arrangement than the more constructed sites – the villas and the allotment gardens along the shoreline. To move the football field and the clubhouses to a more central location in the valley, thereby populating the area and introducing new public activities, would possibly give increased values to the society as a whole. Moving the sports activities would make room for the threatened biotopes of the Välen nature area and alter the sports field into a new kind of recreational space. Moreover, the wetland fields infiltrate the polluted stormwater from the upper part of the valley. The main issue here, then, is to highlight and test the difficult choices of the future when one value stands against another, inviting others to discuss the issue.

When sites have more obvious monetary values, such as the allotment gardens and villas along the south and southeastern shoreline of Välenviken and Stora Ån, the alteration suggested is to protect the area with a dyke. *Site 6a and 6b Stora Ån-Välenviken Waterfront Dyke* introduces the dyke construction, most common in The Netherlands, into the landscape, and in the design the big structure is made accessible in order to prevent it from being a barrier, although that is its real function. In addition to this windmills are positioned on the hilltops to be able to pump the water from the protected areas. The locally produced electricity can be a community based economic association, form which not only the pump-system can be run but also the local households and allotment owners can get their electricity. Only by collaborating with the stakeholders and with construction engineers and economists will the actual costs over time be valued. And once again the question is raised of how much the society is willing to pay and what to be protected and how to prioritize.[15]

15. The project Centrala Älvstaden handles the issues of sea level rise in the central areas of Gothenburg, including the harbor areas. When national interests, like the Gothenburg harbor area, are not at stake there has so far not been any careful investigation or design solutions tested, as was done for the central harbor areas of Gothenburg. The Välen area and other coastline areas in Gotheburg are examples of such neglect. More information can be found on the Gothenburg City official website for the Älvstaden project: http://alvstaden.goteborg.se [2013-08-11].

The most difficult case in the design process was the issue of *Site 7 Välen Landfill Forum*. Not only did the investigation of the issues of soil pollution and the placement of landfills close to the sea show how vastly urban areas have been polluted in modern time, but it also showed how acute the problems of pollutions are today. The timeframe of the concern for the Välen Landfill turned from that of climate change to pollutants like quicksilver leaking into the fishing and bathing waters of the Välen bay today. The alteration, then, is a temporal one.[16] I propose that experts, NGO:s, politicians and the general public, gather, discuss and collect knowledge on how to handle polluted soils and landfills close to the sea in a congress called "Välen Landfill Forum". My knowledge as a landscape architect student thus engages in the spatial arrangement of congress tents, placed outside the polluted area and demarcating the same. I also acknowledge the limits of my profession: I suggest experts to gather and discuss future solutions on pollution with the expectation that the impact of such a congress would benefit the Välen area, the overall polluted areas of Gothenburg as well as other parts of the country.

The seventh alteration therefore also highlights the issue of time. All of the issues of concern have different timeframes, but how to understand the future? There are no governments elected for the period of major impacts of the climate change. How to take responsibility for generations to come, and who are those people, and how can we understand the lives they will live? I did not make a hierarchy between the alterations, how to prioritize, or what to do when, because everything could start tomorrow as these are suggestions made from the horizon of life today – and my imaginations stops there – since in fifty years the issues of concern will be different. Could I have planned the design process in order to take time into account – like Chemetoff?[17] In this case a time strategy would be made in collaboration with others in a phase after this thesis.

16. Gothenburg city is known for being a city of events, hosting festivals, sports events and mega concerts.

17. One interesting example of time in design is Chertoff's concept for Il de Nantes (Chemetoff 2009, pp 366-459).

3.2 REFLECTIONS ON MATERIAL AND METHOD IN THE TEST DESIGN

The material, the site reading, is a subjective process; it is a selective process and according to the principles of working knowledge (as described in the introduction) it can be viewed as part of a larger site reading where many professions and stakeholders bring knowledge to a site. It can also be viewed as an excluding process where collaboration is not taking part. When working alone on site interpretation one becomes a reader, like in the situation above, not an objective observer; one reads documents and situations from one's own discourse, personal experiences and concerns. This is most obvious when reading national, regional or municipal policy documents, which are documents with a particular discourse, strangely balancing between, on the one hand, being written with a clear language and on the other hand having a vague message. It is difficult to know what is metaphor and what is epistemology. When reading vegetation or spatial relations the perspective is tuned with other parallel experiences.
The case study must, due to these circumstances, be regarded as only one interpretation, only one line of thought, only one experiment and one experience – a fragment. The idea of tracking down and understanding panarchies or deciding upon requisite information and efficiency is with this working knowledge perspective, in contrast to that of ecologists (Salt, D., & Walker, B., 2012, p 23; Erntson H. et al., 2010), an insuperable as well as an undesired goal. What is found depends on the reader.

The modes of representation have been experimental. By layering archive and municipal maps, own enhancements, drawings and interpretation maps etc. it has been possible to retain a transparency of sources used. This is in correspondence with the test design as a whole: site interpretation, to gain knowledge from what is already there, what is already made, building upon the current situation. Drawing sections was a start and could have been explored even further, illustrating time depth, spatial arrangements, functional variation, experiences etc. Now, plans and photos are used to complement with that kind of information. The use of photos is both evasive and informative since they give a notion of what the sites look like to the reader of the thesis, but they are not as objective as they seem to be, therefore picture texts are added to clarify what the photos represent. Complementing with drawings can also be a way to make that clarification. As a final remark, the alterations are represented with a sketch placed onto the current situation and pared with the original picture, which is without any additions. Here the drawing is sparse and complemented with explanatory texts and schematic sections and plans in order to balance between saying something about the possible physical design and not saying too much, as the detailed design only can be done after negotiation.

3.3 REFLECTIONS ON MATERIAL AND METHOD IN THE THEORY PART

When doing trans-areal studies the in-depth or broad readings, where materials can be compared and patterns start to occur, suffer from the need to gain the most basic knowledge first. In this literature study the project questions needed to be the driving force in a very pragmatic way, which did not allow a deep reading but a basic overview of the three subject areas: "On social-ecological resilience", "On resilient cities" and "On resilience and landscape architecture", as they represent areas that answer to the project question, which includes ecology and urbanity, from the perspective of landscape architecture. Another difficulty when reading literature from another field of discourse than landscape architecture is the ontological and epistemological differences. When jumping between discourses one is thrown between texts that presuppose the reader as an interpreting subject and an objective observer. The scientific papers address their own field of science; in these texts there are situations where I as a reader do not even notice when a concept is used metaphorically or when it is used as a signifier, as I am not part of the coded language of the addressed discourse. The intention of doing trans-areal studies was despite these differences to deliberatively be evoked by another field of science and to transform and compare the insights gained from that reading into the field of landscape architecture. The

literature review then contributed by showing that also my own field will appear difficult to read for other professions, which calls for consciousness when collaborating with others, concerning the language use and the time necessary to get closer to understanding one another.

3.4 FINAL REFLECTIONS

Ecological concerns are matters that are site specific or, to use a vocabulary influenced by resilience thinking once again, one needs to know one's systems in order to assess and manage their resilience or to steer a transformation of them. In order to work towards sustainability, the question of *what* is to be resilient to *what*, or *what* is sustainable needs to be re-interpreted every time design decisions or action are about to take place. I suggest a broad understanding of site, as sites exist within many different contexts and as they are not limited by geographic location. Thus, shifting scales, looking for connections across domains and collaborating with others help to deepen and broaden the interpretation of a site. By acknowledging the interconnectedness of sites the consequences and contributions of a design intervention work in correspondence to that interconnectedness. Therefore, a design proposition will benefit from discussion and evaluation across disciplines and between stakeholders.

This master project has thus evoked my curiosity for possible approaches to work as a landscape architect. As one engages in concerns that overlap different fields of science/practices – in this case, the multidisciplinary framework of sustainability and resilience – the need to be informed by other epistemologies has resulted in further possibilities for a more resilient design practice.

In order to develop through the study of other fields there is a need to be clear of the own interpretation of that epistemology and how it is used. Balancing between discourses calls for extra consciousness with words. There is also a need to play with the vocabulary within a project, since this will trigger the frames of imagination, much like the word resilience did for me. Part of the vocabulary is also the mode of representation, be it the graphic representation, an oral presentation of the project or the use of different multimedia tools. Representation is simultaneously a selection, a construction and a delimitation of the heterogeneity, the redundancy, the dynamics and the interconnectedness of a site; hence the challenge for the profession of landscape architecture to communicate and present an interpretation of site without defining it as something stable.

Being informed by other practices or fields of science does blur the borders between them, but the separate fields can simultaneously be strengthened and developed by the information needed for understanding a common concern. Landscape architecture already has a tradition of learning from other fields of science, which is a sort of openness that can be interpreted as a resilience property that actually strengthens the profession as such.

The landscape architecture profession, being turned towards site, has the potential to ensure that site matters are intertwined with development, and that development is interpreted through site. This approach will simultaneously challenge the ethics/aesthetics/politics of site design, as the specificity of site provokes particularity in design: specific alterations. In future work I hope to elaborate on this philosophy of interconnectedness (ethics/aesthetics/politics), which will affect the project strategy, the site concerns and the alteration aesthetics.

Continuing the method of learning through reflective practice – the theory + case study/projects method – could help to develop the profession. Through this method, theory will be site-specifically analysed, allowing a pendular movement between what is general knowledge and what is contextual/relational knowledge. This pendular movement corresponds to the need for shifting scales and domains within resilience thinking.

On a personal level, the issue of time comes back at every step of the design, when working through the lens of resilience, but what

I would like to put emphasis on regarding future work is the design of the project itself taking time into account. As a student doing a master project, one is limited by the timeframe of the course and by the project question. I have not been able, in this or in previous projects during my education, to be simultaneously a director and an actor in time (and space). A "real project" could allow site interpretations to go on over time, in order for the site to influence the design in a more dynamic way. I look forward with enthusiasm to such a project layout.

Time and timing are also active parts in deciding how and when to start a dialogue with citizens or stakeholders in order to develop a project. It is within this theme that I believe the Resilient Cities organization can be most helpful, as it has gathered papers on governance and examples of how to conduct public collaboration projects, an issue that was not part of this master project but will be useful for future studies and practices. Not only can the public collaboration process, but also the issues of concern, be developed through dialogue, in which the landscape architect holds one of many valuable perspectives.

To embrace time, time as change or disturbance, and thereby use time as an actor in the design, as material or resource, are matters for further study in the detailed design process. For example flooding the management, of temporal activities, but also the robustness, origin and aging of materials, will either be design components or the main directors of the design from the start, in emerging a design towards a particular experience. When using time in this sense the theories of ecosystems dynamics are of great use.

This master project has made me believe that almost any site can be interesting, as it is redundant. But exploring that redundancy takes time. I will end these reflections repeating a quote by Sieverts that has grown on me during the work: "Improving the quality of fragmented urban landscapes requires courage, patience and a passionate zest for the future". It takes courage to highlight the issues of concern, as this is a balance between ethics and politics; it takes patience to gather knowledge, as there are no models for how or what to gather; it takes zest for the future to stand prepared, because there are multiple challenges ahead.

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